# Gas Journal

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# Editorial Notes

## Baffler Performance and Safety

THERE can, we suggest, be nothing but agreement with the conclusions drawn and recommendations made by Mr. T. G. Noble, of the Gas Light and Coke Company, and Mr. T. J. Legg, formerly of that Company and now with Messrs. R. & A. Main, Ltd., in the Paper which they gave last Friday at a meeting of the London and Southern District Junior Gas Association. It is a most valuable contribution on the subject of baffler performance in relation to the safety of gas appliances. At the commencement of their Paper the Authors remark rightly that bafflers are primarily safety devices; and they share our own views when they say that they are the most important safety devices fitted to properly adjusted flued gas appliances. Of course, the most important of all the functions of a baffler is to guard the gas appliance against the effect of downdraught. Unless, however, the baffler is in the same room as the appliance it becomes to all intents and purposes a terminal, exposed as a terminal may be to adverse pressures, and affording no certain safeguard to the appliance. As far as downblow is concerned the baffler should be regarded as an essential safety device; but the fact that it is fitted should not result in any relaxation in the efforts made to lead away the products of combustion through the secondary flue. The importance of adequate dimensions for the latter, its position, and the manner of its termination must not be underestimated.

We thoroughly agree with the observation made in the Paper that there is no such thing as a good baffler *per se*, and that a rigid specification for baffler performance must take into account the particular appliance to which the baffler is to be attached. The "general purposes baffler" should no longer be used. Each appliance should be definitely associated with a particular baffler, either as an integral part or listed as an essential fitting not to be replaced by something else "just as good," any necessary primary flue being incorporated in the appliance or the baffler. We would emphasize strongly this point that each appliance should be associated with a specified baffler. There is, of course, a parallelism in modern motor car design. The carburetter or magneto is not just a carburetter or magneto which can be fitted at random to any car and give satisfactory results. A type of carburetter which may suit one car may—and, in fact, does—prove unsatisfactory if applied similarly to a car of different design and performance. Once it is recognized that an appliance is incomplete without its baffler the tiresome question, "Where should the baffler be fixed?" will cease to be discussed, and concentration will be usefully applied to ensuring that the bafflers supplied as parts of appliances are reliable in design and do not require impracticable lengths of secondary flue to ensure their normally clearing products of combustion.

Discussing the general points of baffler construction the Authors of this important Paper observe that for many domestic water heaters vitreous enamelled mild steel sheet has proved very satisfactory as a corrosion resisting material. Together with enamelled cast iron for the larger appliances, it is, in their opinion, the best material available. Where its capital cost, reasonable though it is in relation to its life, is a serious obstacle to its use, it is worth considering how far the more vital parts of the baffler can be made in this material, the rest of the baffler being of cheaper construction. No part of a baffler, they maintain, should be made in sheet iron protected only by a coat of paint, galvanizing after manufacture being an essential minimum treatment. Again, as a general principle, bafflers should be designed so that the vital parts should be susceptible to easy and accurate registration with one another during manufacture and so that as far as possible any indefinite curves should be avoided. It is, however, with the main theme of the Paper that we are concerned here. We fail to appreciate any valid reasons for supplying appliances—other, of course, than those designed to be used fluelessly—without bafflers either integral with the appliances (which we prefer) or sent out therewith as essential fittings. There is, as the Authors remark, no inherent reason why a baffler supplied as suggested should be more expensive than one bought separately; and there is every advantage in knowing that whatever flue equipment is added to an appliance subsequently to its being sold, danger to the user and, at the very least, loss of prestige to the maker and gas undertaking cannot result. In this matter, as in so many others concerned with efficient gas service, there is need for collaboration between gas undertaking and appliance manufacturer.

The idea behind this, which we have called the main theme of the Paper, is, of course, not new, and it is not surprising that a large measure of agreement with it was displayed by representatives of appliance makers who joined in the discussion. Apart from the question of safety which is everybody's concern, the makers naturally have as a major concern the satisfactory performance of their appliances when in use on the district. The point is that perfectly satisfactory appliances in themselves can,

if coupled to unsuitable bafflers, have their performance seriously impaired; and the Authors of the Paper under review have rendered a signal service in giving prominence to a matter which we have had at heart for many years.

## Dry Gas

THE Communications of Mr. C. F. Broadhead, of Melbourne, are always extremely interesting and original. Well remembered, for example, is the Paper he prepared for the meeting of The Institution of Gas Engineers in June of 1930, in which he described the manufacture of "Bitural" and the success achieved in its application as a road making material. Remembered, too, is his stimulating Presidential Address to the Australian Gas Institute in 1934, though with some of his views we could not see eye-to-eye with him. Mr. Broadhead's latest Paper is that which he presented at the Annual Convention of the Australian Gas Institute held in Adelaide at the end of November last. This time his subject was dry gas, and an extract from the contribution will be found on later pages of our issue to-day. "The supply of dry gas is the greatest advance in the Industry since the introduction of the vertical retort." This quotation from Mr. Broadhead's Paper shows well enough that he is in no two minds as to whether it is good practice to remove the major portion of the moisture from the gas as made—or an amount sufficient to prevent any deposition in the distributing system. At the West Melbourne Works of the Metropolitan Gas Company a Holmes "Dri-Gas" plant was placed in commission at the end of 1933. The plant is capable of handling 15 million cu.ft. of gas daily, and Mr. Broadhead explains that so far no replacements of plant have been necessary, and that in his experience criticism concerning maintenance of the plant is unwarranted. The value of dehydration on the distribution system was immediately reflected by diminution in complaints, and the reduction has been continuous since.

Of particular interest is the system of dehydration at the South Melbourne Works of the Company, where the average daily make is 950,000 cu.ft. Here the method adopted is intense cooling of the gas. After passing through the purifiers the gas is led to a tower scrubber packed with grids down which flows cold water from a refrigeration plant. The temperature of the water is such as to condense out the superfluous moisture from the gas. The process, the Author states, removes some 12 tons of actual gum-forming compounds from the town gas per year. Furthermore, the organic sulphur compounds in the gas are reduced by 25%, and all the ammonia is absorbed, so that not a trace passes forward. During the twelve months ended June 30, 1936, the average content of sulphur compounds in the gas produced at the South Melbourne Works was under 10 grains per 100 cu.ft.; and readers will readily appreciate what this means to the satisfactory utilization of gas on the district. Again, prior to the use of the intense cooling plant at South Melbourne the naphthalene content of the gas amounted to 10 to 12 grains per 100 cu.ft., but now there is scarcely a trace of it. The reduction in calorific value caused by oil deposition is almost exactly balanced by an increase due to the reduction in volume of the gas by moisture removal. Regarding operating costs, those for the year ended June 30, 1936, are given by Mr. Broadhead as 0·128d. per 1,000 cu.ft. for the calcium chloride process at the West Melbourne Works and 0·299d. per 1,000 cu.ft. with intense cooling at the South Melbourne Works. It must be borne in mind, however, that the capacities of the two works are very different indeed, and that the plant at South Melbourne if working to full capacity would show a figure considerably less than 0·299d. per 1,000 cu.ft. On a large-scale plant, states Mr. Broadhead, the cost of the intense cooling process would be correspondingly lower, which "appears to make it an attractive proposition."

We would also call attention to that section of Mr. Broadhead's Paper dealing with the effect of dehydrated gas on meter maintenance. Defective meters changed during 1934 totalled 4·76% of those in use. In 1935 the figure was reduced to 3·90%, and up to Sept. 30, 1936, there was a decrease of over 14% on the corresponding three quarters of 1935. This the Author attributes to the adoption of dehydration of the gas supplied. It is estimated that the savings effected by the Distribution Department will more than offset the cost of dehydration. Quite apart from any saving, however, the benefit derived by the reduction in complaints is well worth the cost of the process.

## Progress in Australia

SINCE 1930 the Australian Gas Light Company has undertaken the task of compiling annually statistics of the progress of the Gas Industry in Australia. Actually the data refer to 73 undertakings, but they reflect substantially the progress of the entire Industry. A year ago we recorded in these columns that the results reported for 1934 showed an increase in the consumption per consumer, which we regard as the best index to security. The figures for 1935 show another gain in the right direction, though some leeway has still to be made up before the average consumption reaches once again that of 1930. We feel, however, that this will soon be achieved, and that it will be the result in large measure of the establishment of the National Gas Association of Australia, which, though formed only a year ago, has already accomplished a great deal. Membership now includes, in addition to undertakings making more than 90% of the town gas used in Australia, a large number of the principal gas appliance manufacturers. It is fostering that co-operative spirit so essential to the future welfare of the Industry; and the technical information it has already collated and circulated has been the means of obtaining further leads. In future, compilation of the annual statistics of the Australian Gas Industry will be carried out by the Association.

The year 1935, to which the present figures relate, was a good one for the Australian Gas Industry. Total sales of gas showed an increase of 3·35% over those of 1934, and this movement follows an increase of 2·04% in 1934 as compared with 1933. The number of customers served, at 782,000, is the greatest recorded since information on the subject has been obtainable. The average consumption per consumer rose from 20,886 cu.ft. to 21,038 cu.ft.; it has to rise to 22,995 cu.ft. to equal the figure for 1930. The yield of tar is a striking figure at 21 gallons per ton of coal carbonized. Of course, as was mentioned by Mr. O'Dea in his Presidential Address to the Australian Gas Institute, the Australian Gas Industry is very fortunate in its supply of gas coals. On the average these maintain 40% of volatile matter, an ash content of from 4% to 6%, and a sulphur content of 1% or under.

A matter of 20,000 cu.ft. of 500 B.Th.U. gas (100 therms) to the ton has been obtained on carbonization, and up to 18,000 cu.ft. of 500 B.Th.U. gas (90 therms) with up-to-date carbonizing plant is expected by most engineers. One other point may be mentioned from the Australian statistics—unaccounted-for gas averaging 11·5%. Actually five undertakings recorded over 30% for unaccounted-for gas, while one undertaking returned a figure of over 41%.

## Better Building

It is computed that during recent years the nation has been investing something like £150,000,000 per annum in new houses; and an inspection of some of the "estates" which have been, or are being, "developed" in all directions by the provision of dwellings built to sell, will go a good way towards creating a proper understanding of what Mr. George Hicks, M.P., President of the National Federation of Building Trades Operatives, meant when he remarked, a week or so ago, that building offers so many opportunities for adulteration that they must all be careful to safeguard purchasers against victimization and fraud. The handiwork of the "jerry-builder" is still encountered; for we have the assertion of Mr. G. H. Parker, President of the National Federation of Building Trades Employers, that of late years there has been complaint that many houses have been built which were constructionally unsatisfactory, and that these had been sold to an unsuspecting and unprotected public. Thereby a mean fraud had been perpetrated on the unfortunate purchaser, and the building industry had been brought into ill-repute. This being so, a scheme has been devised by the building industry itself to promote sound construction, and this has been approved by both the Ministry of Health and the Board of Trade.

The main points of this scheme are the formulation of a minimum standard specification for ordinary houses and the certification of dwellings so built, and the proposals should be assured of the approbation of the Gas Industry, who have themselves, in their time, had convincing proof of the necessity for minimum specifications and certification of work done. In their own case, no doubt, the prime consideration has been safety, but apart from this there was the fact that an efficient supply of gas could be assured only by the provision of adequate pipes and fittings. With housebuilding, the considerations are, in a way, the same. A dwelling of faulty construction may lead to various sorts of serious, or even fatal, diseases; while, in the conditions under which so many of the small new houses have now to be acquired by young people, the factor of expense may also make or mar a life. What are needed, to quote the Minister of Health, Sir Kingsley Wood, are houses capable of becoming real homes, and not sources of trouble and expense. This should not be too much for the purchasers to expect—particularly in view of the prices that are nowadays demanded for newly-erected dwellings.

The provision of competent workmanship, sound material, and adequate installations is an end which our own Industry ensures, in connection with the supply of gas, by all such means as lie in its power—if any undertaking does not do so, it should hasten to reform—and this it will assuredly continue to do, with even added zeal, when the "jerry-builder" is defunct. So long as the younger generation go on demanding higher standards of housing, so long must the Gas Industry strive to give better, and still better, service, with increased efficiency, and yet greater comfort.

## Grass-Drying Progress

The artificial drying of grass by means of coke furnaces—a process to which we introduced our readers in these columns last September as providing an excellent prospect for additional coke sales—has been growing in favour in different parts of the country during recent months. Progress, where plant involving so relatively high a capital outlay is concerned, must necessarily be slow; but it is gratifying to find that widespread recognition is beginning to be given to the process as one of national importance. For example, last Monday *The Times* published an interesting review by its Agricultural Correspondent of the recent developments of the process and referred to useful information made available at the recent Oxford Conference on Mechanized Farming.

Last summer there were forty-six grass-drying plants in operation, and it is estimated that the total output was about 10,000 tons. In the United States grass-drying is going ahead, while there are also developments on the Continent; but abroad the drying is carried out mainly in large units on a factory scale and not so much on farms. As the pioneers in this country—among whom we must not forget the London and Counties Coke Association, who did so much to set the process on foot—are well satisfied with their venture and are convinced that they can obtain better results in the future, there is every reason to believe that more driers will be at work next summer. The idea of greater self-sufficiency in foodstuffs is one which appeals to most farmers as sound practice, and there is a general opinion that dried grass is superior to hay and concentrated foods such as oil-cakes.

The cost of producing dried grass, stated *The Times* article, has worked out rather higher than the enthusiasts first estimated. To produce a ton of dried grass in 1936 cost about £6 on the average. Theoretically the cost should have been nearer £4—as was suggested in our own review of the process—but it must be remembered that 1936 was a very wet summer, which meant that a great deal more moisture had to be evaporated. It may, however, be confidently anticipated that, unless there is a further rise in the price of coke or some other item in the cost of drying, we can look forward to dried grass costing less than £6 per ton to produce in the future.

The market value of the product is likely to depend partly on the quality of the season's hay. The demand will be governed to some extent by the supply of prime June hay, without which the farmer reckons that his cows will not milk as they should. If he has not good hay he is likely to buy dried grass, for which, it is suggested, dairy farmers would gladly pay £8 per ton. It is observed that very few producers have succeeded in keeping their driers going day and night; some have not attempted to do so, as grass drying has been introduced as part of the farm routine and not as a factory enterprise for the sale of the product. Also, the small capacity of the driers has proved a disadvantage, because in the early summer, when the grass is growing fast, it has not been found possible to keep pace with the growth. It is doubtful if last year more than one-third of the grass dried was in the young leafy stage when the feeding value is highest.

There is no longer any question, however, as to the value and importance of the grass-drying process to farming in this country, and gas undertakings which are not exploring the potentialities of this field in their own areas are losing valuable opportunities of augmenting their coke load.

# Shewring Fund

Following the publication last week of the statement by the honorary Auditors, we have much pleasure in reproducing a letter received from Mr. F. G. Shaw:

W. Rupert King, Esq.,
Editor, "Gas Journal."

Dear Mr. King,—

The time would seem appropriate, after the publication this week of your audited statement, for me to ask you once more for the use of some of your valuable space for an expression of gratitude to all who have done so much in the cause which Mr. W. W. Townsend, Mr. James Bridge, and I brought to the attention of your readers last July.

We know that your Paper does not desire any eulogies for the invaluable part which it has played, nor you personally for the considerable amount of detailed work which has necessarily fallen upon you as Hon. Treasurer to the Fund. We realize that any call appertaining to the honour and credit of the Gas Industry, by tradition and as a matter of course, finds immediate response in the "Journal." The same reasoning might indeed be advanced for the omission of any formal expression of thanks, except that Mrs. Shewring, who obviously cannot acknowledge so many kindnesses individually, has charged us with conveying, through any means which may be open to us, her truly heart-felt gratitude.

The result of the appeal—a total of £983 18s. 4d.—has, I think, exceeded all our expectations. Even so, to those of us who have not been faced with sudden calamity as were Mrs. Shewring and her family, it may not seem a vast sum with which to face the future. You, Mr. King, together with my two collaborators and myself, are, however, in a better position to appreciate, from the circumstances into which it has been our duty to enquire, the real significance of this timely aid, and to assure subscribers of the full measure of thanks which Mrs. Shewring wishes me to express.

For the fact that the whole of the subscriptions were available for her benefit, we have to thank a friend, who desires to remain anonymous, for guaranteeing all expenses in connection with the Fund. We would also take this opportunity of expressing our gratitude to all those who in sundry ways helped in giving publicity to the Fund, particularly the Secretaries of the District Associations, and your two contemporaries in the Gas Press.

The disposal of the available funds was detailed in the statement which your Auditors so kindly supplied for publication. From this it will be clear that we who took the initiative in interesting the Gas Industry in the matter, are giving our continued assistance to Mrs. Shewring in the management of such part of the Fund as she is able, in the meantime, to regard as Capital. Mrs. Shewring has expressed her intention of co-operating with us to the very best of her ability in the eventual interests of her young family.

Yours sincerely,
F. G. Shaw.

*Buxton Corporation Gas Department,*
*Gas Service Buildings,*
*Buxton,*
*Jan. 22, 1937.*

# Personal

Mr. John R. Gentry, who has for the past 17 years been Engineer and Manager to the Irvine Gas Company, Ayrshire, has retired on pension through ill-health, and Mr. Andrew Walker, Manager, Kilbarchan, has been appointed his successor. Both these Undertakings are controlled by the Caledonian Gas Corporation, Ltd.

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Mr. F. Dawson, B.Sc., A.M.Inst.C.E., A.M.Inst.Gas E., has been appointed Engineer and Manager of the Herne Bay Gas Company, Ltd., in succession to Mr. D. H. Davies, who retired last month, after having served the Company in that capacity for over eighteen years. Mr. Dawson was an Assistant Engineer at the Fulham Works of the Gas Light and Coke Company for some years.

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Congratulations will be extended by his many friends in the Industry to Councillor Walter Muter, Chairman of the Public Utilities Committee and formerly Convener of the Gas Department of the City of Edinburgh, upon his appointment as a Justice of the Peace for the County of the City of Edinburgh.

# Obituary

Mr. Joshua Alfred Davy, General Manager of Benzol and By-Products, Ltd., of Crigglestone, died in a Leeds nursing home on Jan. 21, after a brief illness, at the age of 64 years. Mr. Davy, a native of Middlesbrough, was for some time associated with Dorman Long, Ltd., and later Leeds Manager for the German firm, Hilgenstock Coke Oven Company, builders of coke and by-product plant. He became General Manager of Benzol and By-Products, Ltd., 13 years ago. He was a Past-President of the Coke Oven Managers' Association and served on many important committees connected with the industry. He had intended to retire 18 months ago, but continued by the wish of the Board.

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Mr. Peter Garner Wright, a Director of a number of gas companies, including those of Hellifield, Normanton, and Mirfield in the West Riding, and for 60 years connected with Stewarts & Lloyds, Ltd., died on Jan. 20 at his home, Avenue Victoria, Scarborough, aged 79 years.

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The death has occurred at Girvan, at the age of 82, of Mr. Walter Armstrong, who had been in Girvan for 26 years as a manufacturer of hand-woven tweeds and who was a Director of Girvan Gas Company for many years. He is survived by his widow, two sons, and two daughters.

# Forthcoming Engagements

**Jan.**

28.—B.C.G.A.—District Meeting at Newcastle-upon-Tyne.
29.—B.C.G.A.—District Meeting at Exeter.
29.—I.G.E.—Liquor Effluents and Ammonia Committee, 11.15 a.m.; Joint Research Committee, 2.30 p.m.

**Feb.**

2.—B.C.G.A.—Annual Meeting of members in Manchester District, Midland Hotel, Manchester, 3 p.m.
3.—Manchester and District Juniors.—Visit to West's Gas Improvement Co., Ltd.; Paper by J. Holland, "Works Reconstruction with Economies."
4.—Midland Juniors.—Paper by W. N. Smirles, "Gas-Heated Hot Water Systems."
5.—Manchester Association.—Visit to Works of Walpamur, Darwen; Paper on "Painting and Maintenance of Structural Work."
6.—Scottish Western Juniors.—Annual Whist Drive and Dance.
6.—Scottish Eastern Juniors.—Visit to Dundee Gas-Works; Paper by D. Warden.
12.—London and Southern Juniors.—Paper by F. O. Hawes, "The Effects of Changes in Composition upon the Combustion of Town Gas."
13.—Scottish Western Juniors.—Debate Meeting.
17.—B.C.G.A.—Meeting of Executive Committee, 11.30 a.m.
18.—Junior Associations.—Visit to B.I.F., Birmingham.
20.—Western Juniors.—Meeting at Bath; Paper by F. G. Craxford, "The History and Development of Gas Fitting."
23-25.—B.G.F.—Joint Gas Conference at the B.I.F., Birmingham.
26.—I.G.E.—Gasholder Committee, 2.30 p.m.
27.—Scottish Junior Association.—Joint Meeting at Edinburgh; Paper by F. B. Holmes, "Scrubbers."

**March.**

4.—Midland Juniors.—Paper by H. Wynne (Burton-on-Trent).
10.—London and Southern Juniors.—Visit to Teape & Co., Paper Mills, Dartford.
12.—Manchester Association.—Annual Luncheon, Midland Hotel, Manchester, 1 p.m. Mr. R. N. Webb will subsequently read his Presidential Address.
13.—Scottish Western Juniors.—Visit to Glenboig Brickworks.
16.—Southern Association.—General Meeting at Hotel Victoria, Northumberland Avenue, W.C. 2, 2.30 p.m.
17.—Manchester District and Yorkshire Juniors.—Joint visit to Stanton Ironworks Company, Ltd., Derby. Paper by T. H. Wilson, "The Manufacture of Cast-Iron Pipes."

# News in Brief

CURRENT EVENTS IN THE GAS INDUSTRY

**From the Society of Engineers** we have received the Journal and Transactions of the Society for October-December, 1936.

**A New Tully Plant** has just been installed at the Berwick and Tweedmouth Gaslight Company's works. The new plant has been rendered necessary owing to the increased demand for gas.

**Among the Objects** of a Special Order for which the Hemsworth, Grimethorpe, and District Gas Company intend applying to the Board of Trade, under the Gas Undertakings Acts, 1920 to 1934, is an extension of the existing limits of supply.

**Tenders for a New Purifying Plant** to be erected at Leven gas-works were considered at a meeting of Buckhaven and Leven Gas Commissioners on Jan. 18. That submitted by Messrs. H. Balfour & Co., Ltd., Durie Foundry, Leven, was unanimously accepted.

**The Post of Works Superintendent** is vacant at Warrington. Applications are invited, the commencing salary offered being £300. Particulars will be found in our advertisement columns. The Gas Department also invites applications for the post of draughtsman at a commencing salary of £245 per annum.

**The Queensferry Plant** for the production of "Stellite" smokeless fuel is now nearing completion, and Stellite, Ltd., is handling between 1,000 and 1,200 tons of coal a week. The benzole and by-product plant is also nearly completed. Deliveries of smokeless fuel are being made to consumers in the district.

**A Wide Area** in Port Glasgow was without electricity for the greater part of an hour on Jan. 21 as the result of a failure. During the period one of the shipyards was at a standstill, and the Post Office and railway passenger station were without light. Business premises in the Princes Street area were also affected.

**The Services are Required** by the Bath Gas Company of a Works Superintendent, who must have had a thorough training in mechanical engineering and gas-works practice. The commencing salary will be £350 to £400 per annum, according to experience and qualifications. Further particulars will be found in our advertisement pages.

**A Meeting of the Burntisland Town Council** was held on Jan. 21, Provost Leith presiding. Mr. W. Brown (Gas Engineer and Manager) in his report stated that during the quarter ended Dec. 31, 1936, 853 tons of coal had been carbonized, producing 14,106,000 cu.ft. of gas as against 795 tons producing 14,026,000 cu.ft. in the corresponding period of 1935, an increase of 80,000 cu.ft.

**The City and Guilds of London Institute** has published the Report for 1935-36 of the Department of Technology. The Report, which is obtainable from the Department at 31, Brechin Place, London, S.W. 7, price 1s., shows that the total number of candidates examined by the Department during the year under review in all subjects at home and overseas was 26,468, an increase of 2,279 on the figure for the previous year.

**"Coming Events Cast their Shadows Before,"** said the Deputy Lord Mayor of Stoke-on-Trent (Alderman J. H. Dale), speaking at a meeting of the City Council on Saturday, Jan. 16. He observed that at the next meeting it would be reported that 100 million cu.ft. more gas had been sold than at this time a year ago. With the growing use of gas it was hoped eventually that Stoke-on-Trent would be made into a smokeless city.

**According to Statistics** compiled annually by Jordan & Sons, Ltd., Company Registration Agents, of Chancery Lane, W.C. 2, there were in England a larger number of new companies registered in 1936 than in any preceding year. The total was 13,742, an increase of 639 over the previous year (itself a record). The total nominal capital, £158,221,238, although not a record, is £21,587,128 in advance of the 1935 figures (£136,634,110). As a contribution to the problem of the Special Areas, the Special Areas Reconstruction Association, Ltd., was formed to aid the development of small businesses in the Areas by means of credit facilities, also the two local concerns (Limited by Guarantee), viz., "The North Eastern Trading Estates, Ltd.," and "The South Wales and Monmouthshire Trading Estates, Ltd.," in the same interest.

**The Showrooms and Offices** of the Chester United Gas Company have been modernized. The whole of the front of the premises has been demolished, and in its place an artistic frontage of oak half-timbered design has been erected. The frontage has an "overhanging" top storey, with beautifully lined beams, for the development of the window space, and the main beam on the first floor has been carved with the lettering "Chester United Gas Company." The name, "Chester House," which the Company retain, is also carved in a prominent position.

**The Tender** of Gas Chambers and Coke Ovens, Ltd., for C.O.L. intermittent vertical chamber plant for Petone, near Wellington, New Zealand, has received the official approval of the Loans Board of New Zealand for acceptance. The plant will have a daily capacity of 500,000 cu.ft. and will consist of eight chambers divided into two settings of three chambers and one setting of two chambers, together with coal handling, crushing, and coke quenching equipment, as well as waste-heat boiler. The settings will be heated by an independent battery of step-grate producers.

**The Inspiration of the Stoke Attack**, according to Ivan Sharpe, the Sports Critic, in the *Sunday Chronicle* for Jan. 17, was Mr. Therm, who viewed the Cup-tie match with Birmingham from a nearby gasholder of the Stoke-on-Trent Gas Department. Our readers will recall that the Department recently painted Mr. Therm with the slogan "Mr. Therm Always Scores" on the holder which overlooks the ground. Stoke won by 4 goals to 1, and Mr. Sharpe observes, when referring to Mr. Therm, "if this pretty picture did not inspire Stoke and bewilder the blues of Birmingham, what did?"

**The Manufacture of Gas Cookers** was the subject of a lecture given at a recent Meeting of the Metropolitan Gas Company Sales Staff Association, Melbourne, by Mr. Frank Ayre, the Australian Manager of the Parkinson Stove Company, Ltd. An interesting discussion followed. The practical aspect of cooker manufacture was covered by the Association visiting the Company's Footscray Works. After a tour of the various Departments the party was entertained at tea, when Mr. G. W. Wales (Distribution Engineer) proposed a vote of thanks to the Directors for their hospitality. Mr. Ayre suitably responded.

**A Large Gathering** in Blackburn Public Hall, on Jan. 20, attended by members of the fitting staffs of Blackburn and other East Lancashire gas undertakings, was addressed by Mr. T. B. V. Hirst, of Ascot Gas Water Heaters, Ltd. Mr. Hirst said the demand for hot water had more than doubled within 30 years. Hot baths were more popular; manufacturers of various goods were advocating more frequent washing to prolong the life of the articles advertised; and hot water was more widely used in ordinary household duties. Gas and electric authorities were striving to obtain water heating "load." In his opinion gas definitely held the field, as it was able to provide instantaneous hot water in unlimited quantities. Mr. Hirst suggested that builders would be wise to consult a gas undertaking upon the question of flues and thereby save trouble later. Mr. J. D. Ashworth (Engineer and Manager of the Blackburn Corporation Gas Undertaking) proposed a vote of thanks to the speaker.

## Growing Industrial Sales

### Leicester's Excellent Progress

The industrial load of the Leicester Gas Department has increased by 50% during the past two years. This is one of the points made by Mr. James Mitchell, Engineer and Manager to the Department, in an interesting article in the December issue of the *Leicester and County Chamber of Commerce Journal*, and it is indicative of the progressive policy of the Department and the growing appreciation that gas is the ideal fuel in industry and commerce. Mr. Mitchell explains that the Department makes consumers' heating problems its own.

In the same issue of the *Chamber of Commerce Journal* is a striking full-page advertisement in colour which shows in a most effective manner the wide range of temperatures obtainable from gaseous firing.

## Amalgamation and Grouping

*United Kingdom and Farnworth and Kearsley.*

The United Kingdom Gas Corporation have offered to purchase the share capital of the Farnworth and Kearsley Gas Company. The shareholders, we understand, have been recommended by the Directors to accept the offer, the terms of which are: £150 in cash for each £100 10% stock "A," £105 in cash for each £100 7% stock "B," and £10 10s. in cash for each 7% "D" share of £10.

*United Kingdom and Hoylake.*

The Hoylake Urban Council has carefully considered the offer of the United Kingdom Gas Corporation, Ltd., to purchase the Council's Gas Undertaking and has unanimously decided to turn it down.

*United Kingdom and Kippax.*

An offer has been received from the United Kingdom Gas Corporation to purchase all the shares of the Kippax and District Gas Company, the terms of the offer being 25s. in cash for each share of £1.

*United Kingdom and Sherburn.*

An offer has been received from the United Kingdom Gas Corporation to purchase all the shares, cum dividend, of the Sherburn and South Milford Gas Company on the basis of £2 in cash for each share of £2.

## Gas Company Dividends

### Commercial.

A final dividend of 2½% (less income-tax) will be recommended by the Directors of the Commercial Gas Company at the Annual General Meeting of the Company on Feb. 18 on the Ordinary Stock of the Company, making, with the interim dividend of 2½% paid in August last, 5% for the year to Dec. 31, 1936. The dividend for the previous year was at the rate of 5%.

### Gas Light and Coke.

The Gas Light and Coke Company announces that the accounts for the past year show that the balance to the credit of the net revenue account will enable the Directors to recommend the payment of dividends for the half-year to Dec. 31 last as follows: On the 4% Consolidated Preference Stock at the rate of £4% per annum; on the 3½% Maximum Stock at the rate of £3 10s.% per annum; and on the Ordinary Stock at the rate of £5 12s.% per annum. The dividend rates are the same as those declared last year. The amount carried forward to the next account has increased from £202,623 13s. 2d. to £213,177 11s. 10d.

### Preston.

The Preston Gas Company have declared dividends of 5% for the half-year on the "A" Stock, and 3½%, less tax, on the "B" Stock. Both these rates are the same as last year.

### South Metropolitan.

The Directors of the South Metropolitan Gas Company will recommend at the forthcoming Annual General Meeting a final dividend of 3% actual, less tax, on the Ordinary Stock, making, with the interim dividend of 2½% paid in September last, 5½% for the year ended Dec. 31, 1936.

The above final dividend of 3% compares with 3¼% paid last year, making the totals for the year 5½% as compared with 5¾%.

### Wandsworth.

The Directors of the Wandsworth and District Gas Company recommend a final dividend on the Consolidated Stock of 3½%, again making 7% for the year.

## Wandsworth and District Gas Bill

### Special General Meeting to be Held

A Special General Meeting of the Proprietors of the Wandsworth and District Gas Company will be held at the Offices of the Company, Fairfield Street, Wandsworth, S.W. 18, on Tuesday, Feb. 2 next, at 3 p.m., for the purpose of considering, and if thought fit of approving, the Bill now being promoted in Parliament. A copy of the proposed Bill will be submitted to the Proprietors for their approval.

The Bill, it will be recalled, provides for the conversion and consolidation of the 5% preference stock of the Company with the existing 4% preference stock on the basis of the issue of £125 of 4% stock for every £100 of 5% stock, and for the raising of the additional capital by the issue of consolidated stock or preference stock, and if preference stock so as to form part of the 4% preference stock, and that any preference stock issued otherwise than as part of the 4% preference stock may be issued, unless otherwise determined by the resolution sanctioning such creation and issue to rank *pari passu* with the 4% preference stock.

## Institution of Engineers-in-Charge

### Address on the Gas Industry

Just why gas should not be given away free of charge and many other misconceptions were dealt with by Mr. R. N. LeFevre, Officer-in-Charge of Training, the Gas Light and Coke Company, when he delivered a lecture on "The Gas Industry" to the Institution of Engineers-in-Charge on Wednesday, Jan. 20.

The successful lecturer is extremely sensible to environment, and from the outset Mr. LeFevre, evidently assuming that the average engineer-in-charge had a fairly good idea of the gas-making process (the Institution recently visited Beckton) and that his Address must also cater for the ladies who were present, devoted himself to the service side of the Industry. The result was that the audience appreciated to the full a lecture which was rather more in the nature of an informal chat, enlivened with little touches of humour and full of interesting facts. At the conclusion of the Address questions were invited and answered to the complete satisfaction of the interrogators.

The Chairman (Mr. R. J. Clark) said that recently he had fitted out his house with a number of gas heaters, but had found them too expensive to run. He wondered whether any economy could have been effected by the fitting of gas governors. Also during recent years the price of electricity had been reduced, and since the price of coal was the same for both utilities, why had not there been a corresponding reduction in the price of gas? In reply, Mr. LeFevre pointed out that to-day it was standard practice to fit governors to all gas radiators. As to the governor saving gas, he pointed out that such was not its function. It was fitted to the appliance to ensure efficient operation. On the question of high cost, Mr. LeFevre said that advantage should have been taken of the two-part tariff of the Gas Light and Coke Company. He then went on to give the comparative costs of gas and electricity and the relative efficiencies of the manufacturing processes of both commodities.

A member said that he personally could substantiate all that the speaker had said on the question of the employees of the Gas Light and Coke Company being a happy family. In any trade union disputes the men always had a very fair deal from the Company. With the abstraction of by-products and the sale of coke at almost the price of coal, he wondered why gas could not be supplied free! This view was soon discounted by Mr. LeFevre, who, among other things, said that there might be something in that speaker's views if the Gas Industry were able to obtain a ton of coke from every ton of coal carbonized. It was indeed a very different matter when only half a ton of coke was obtained from a ton of coal. He also called the attention of the members to the very strict Parliamentary control that was exercised in respect to the Gas Industry. After sundry other questions relating to such matters as the running costs of appliances, the meeting was concluded with a showing of some of the Gas Light Publicity Films.

## Yorkshire Junior Gas Association

### Meeting at Sheffield

Members of the Yorkshire Junior Gas Association gathered at Sheffield on Jan. 16, when a visit was paid to the works of the Sheffield Gas Company at Wincobank to view the new 8 million cu.ft. gasholder now in course of construction, which, when completed, will be the largest spiral-guided gasholder in the world. The holder is of mild steel constructed in a steel tank and has four lifts. The visitors were subsequently conducted over the purification plant, which has a nominal capacity of 10 million cu.ft. per day.

After the inspection the party returned to the Gas Company's Demonstration Rooms in High Street for the usual monthly meeting. The President (Mr. E. R. B. French, of

Leeds), in welcoming the members from the Chair, said it was a matter of great delight to him to be back among them after his recent illness. He wished to thank the many members who had made kindly enquiries and sent good wishes. It had been a matter of great disappointment to have to postpone his Presidential Address, but he hoped to take a later opportunity to give this. The President then introduced Mr. A. E. Wilson, of Huddersfield, who gave a Paper which will be dealt with in a subsequent issue of the "JOURNAL."

Thanks to the Sheffield Gas Company and Mr. Ralph Halkett (General Manager) were expressed on the proposition of Mr. A. W. ELLIOTT (Elland), seconded by Mr. J. W. HOLROYD (Rotherham), and Mr. HALKETT, Jun. (Past-President of the Association), responded on behalf of the Company and his father.

## Blackburn Gas Undertaking

### New Amenities at the Works

A warm welcome was extended to Mr. R. R. Fielding, till recently Chairman of Blackburn Corporation Gas Committee, at Greenbank Gas-Works on Jan. 21, when he formally opened the fine new mess quarters provided for retort stokers, and the commodious billiard room constructed for the staff out of the old plumbing department. The new mess is replete with facilities for cooking and meals, shower baths, steel lockers for each man, changing room, and means for drying clothing. The department was built and equipped by the Greenbank staff in the framework of the telpher girders. Those present included Councillor H. Johnson (new Chairman of the Committee), Councillor J. T. Taylor (Vice-Chairman), Mr. J. D. Ashworth (Gas Engineer and Manager), Mr. E. B. Field (Deputy Manager), Mr. H. N. Dann (Works Superintendent), Mr. T. Richmond (Commercial Superintendent), and Mr. William Hammond (Assistant Works Superintendent).

At the opening ceremony, left to right: Mr. E. B. Field (Deputy Gas Engineer), Councillor Houghton Johnson (Chairman of the Gas Committee), Mr. R. R. Fielding (the former Chairman of the Gas Committee), Councillor J. T. Taylor (Vice-Chairman of the Gas Committee), Councillor J. Carnley, Councillor J. R. Dean, Mr. J. D. Ashworth (Gas Engineer and Manager), and Mr T. Richmond (Commercial Superintendent).

Councillor Johnson said when the Committee considered a formal opening of the new mess and billiard rooms, he suggested Mr. Fielding should perform the ceremony. Speaking non-politically, he regretted they had lost the services of such a valued Chairman, and he hoped his business acumen would not be lost to them. Mr. Fielding took special interest in the social side of the Undertaking, and this was an important part of any industrial unit, whether privately or municipally controlled. Greenbank had a spirit of fellowship of which any department might well be envious.

Mr. Fielding, expressing appreciation of the tribute paid by the Chairman, thanked the Committee for the opportunity of performing such an interesting ceremony. During the time he presided over the Gas Committee, he had an excellent colleague in Councillor Johnson. Together they decided, as far as possible, to eliminate politics, everything being viewed from the standpoint of the good of the Undertaking. They had no discussions except on those lines. He hoped Mr. Johnson would be happy in his new sphere and that the Department would continue to prosper. He felt no department could progress unless it had happy and contented employees, and at Greenbank they tried to give their men the best possible amenities. In Mr. Ashworth they had a splendid Engineer.

## West's Gas Improvement Company, Ltd.

### Current Activities

Several important contracts received during the past few weeks for the construction of carbonizing and fuel-handling installations are prominent in the very satisfactory volume of work which West's Gas Improvement Company, Ltd., have now in hand.

With the Belfast Corporation Gas Department there is a contract for the modernizing of a portion of the extensive Glover-West vertical retort plant in service at the Department's Ormeau Road Works. The remodelled unit will supersede one of the original benches of 40 retorts, and its equipment will include breeze-burning producer accessories, waste-heat recovery plant, coke conveying, and dust extraction machinery. The retorts will be of the new large unit type, each taking the place of two of the original retorts. An extensive coal-handling plant is also on order in connection with the scheme of re-organization of these Works. It includes two electric portal cranes unloading barges and feeding coal through automatic weighers to a system of belt conveyors transporting the water-borne coal to all the retort houses and to storage at the rate of 80 to 100 tons per hour.

A large installation of Glover-West vertical retorts with comprehensive fuel handling services is in hand for the Alliance and Dublin Consumers' Gas Company. Two distinct benches, each of 32 retorts, will form the carbonizing plant. Coaling will be accomplished by mechanical feeder gear operating between concrete storage hoppers and twin 100 tons per hour conveyors of the well-known West lip-bucket type, which in turn will supply pushplate conveyors of similar capacity serving the overhead coal bunkers of the installation. Belt conveyors below the bench will handle coke from the plant, and a fully-automatic skip hoist will deal with breeze for supply to the producers. The equipment also includes a 25-cwt. electric lift and a waste-heat boiler connected to each of the two benches.

The Newcastle-upon-Tyne and Gateshead Gas Company has placed an order for the rebuilding of a portion of the Company's Glover-West carbonizing plant to comprise 40 vertical retorts of the current type, with all necessary new equipment and modifications of existing plant. Waste-heat recovery plant and new skips for the telpher system are included in the contract.

The Gas Department at Chard (Somerset) has ordered an installation of Glover-West vertical retorts with producers equipped to burn breeze under pressure, a horizontal waste-heat boiler, and a steam-driven lift.

Following on recent contracts for extensions to carbonizing plant and the installation of a coke grading unit, West's have now received an order from the Dudley, Brierley Hill, and District Gas Company to remodel with larger retorts the original bench of 16 retorts installed in 1924. In this case also a waste-heat recovery plant will be brought in with the modernized retort bench.

Under a contract entered into with the Galashiels Gas Light Company, Scotland, a bench of 12 Glover-West vertical retorts of the modern design will be constructed to replace the retort bench now reaching the end of its service at this Works. The work of dismantling the old plant and building the new is planned to avoid an interruption of gas production.

From Guelph, Canada, the Company have received an order for an extension to the Glover-West vertical retort installation built for this undertaking in 1931.

## Women's Gas Council

### New Quarters in Gas Industry House

The Women's Gas Council are now settled in their new premises at 1, Grosvenor Place, S.W. 1, where they have an attractively furnished writing room which their members have the right to use when in town. We also understand that this same privilege is granted to the Engineers and Managers who have branches in their areas.

*Demonstrators' Circle.*—A very successful Inaugural Meeting of the London and Home Counties Demonstrators' Circle was held in the Members' Room on Monday of last week, when sixty ladies were present, representing eleven different undertakings. A Committee was appointed, consisting of Miss Baldwin (Croydon Gas Company), Miss

MacKintosh (South Metropolitan Gas Company), and Miss Palfreman (Tottenham and District Gas Company)—Miss Willans (Gas Light and Coke Company), and Miss Papineau (East Surrey Gas Company) being elected Chairman and Vice-Chairman respectively.

The Circle will meet once a month during the winter months, and many suggestions for discussions and practical demonstrations were considered. Membership will be open to Home Service Advisers, Cookery Demonstrators, and Showroom Saleswomen, for which there will be no fee if they are members of the Women's Gas Council.

The next meeting of the Circle will be held on Monday, Feb. 15, at 7.30 p.m.

*The Thirtieth Branch.*—The latest branch was started at the Livesey Institute, Old Kent Road, on Wednesday, Jan. 20, at a well-attended meeting which was addressed by Miss K. M. Halpin.

This is the fourth branch in the South Metropolitan area, the branches at Brixton, Woolwich, and Downham having proved so successful that membership has had to be limited owing to lack of accommodation; but since the Livesey Institute accommodates over five hundred, it is hoped that this will develop into a particularly flourishing centre.

## A Century of Gas at Clitheroe

### Showrooms Inaugurated

Continued development is recorded in Clitheroe's Gas Undertaking. Its centenary was marked by the inauguration, on Jan. 18, of new gas showrooms in Castle Street.

The Mayor (Councillor G. Hargreaves, J.P.) performed the opening ceremony, and Alderman R. Manley, Chairman of the Committee, read a letter from Mr. R. Barrett, Engineer for over 40 years, who was absent through ill-health,

A Group at the Opening Ceremony.

recalling that in its early years coal had to be carted from Burnley at a cost of a shilling a load. Since his appointment the output had been quadrupled. Alderman Manley said up to Dec. 1 last there was an increase in gas sales of 1,750,000 cu.ft. The new gas cookers sold since 1931 had averaged 122 per year. Gas fires fixed in the same period averaged 40 per year, nearly 100 being fixed last year.

Gas showrooms were being opened in various parts of the country, he said, showing the great confidence there was as to the future of the Industry.

Mr. R. W. Harris, Assistant Engineer, said the cheapness and usefulness of gas was being more generally realized. He hoped the new showrooms would be visited "even by those misguided all-electric users, who could thus be convinced of the error of their ways." [Laughter.]

Disagreeing that gas would soon be a thing of the past, Mr. A. Harrison, Engineer to the Accrington District Gas Board, said since that remark was made they had sent out cooking and heating appliances from Accrington showrooms valued at over £2,000,000. The gas output had been practically doubled. The turnover in Accrington showrooms this year would be £22,000.

Councillor George Dewhurst, Electricity Chairman, congratulated the Gas Department on its splendid effort and assured them of keen but clean competition. Inscribed silver-gilt commemoration keys were presented to the Mayor and Alderman Manley.

## Gas Exhibition at Chelmsford

### Opened by the Mayor

An Exhibition of up-to-date gas appliances, combined with practical gas cookery demonstrations, arranged under the auspices of the Chelmsford Corporation Gas Department, was opened at the Central Library, Duke Street, Chelmsford, by the Mayor, Alderman J. O. Thompson, O.B.E., J.P., on Jan. 19. Also collaborating were the British Commercial Gas Association, and the Davis Gas Stove Company.

Alderman L. F. Christy (Chairman of the Borough Gas Committee) had hoped to preside at the opening ceremony but during the week-end he developed an influenza cold, which kept him in bed. His place was taken by Councillor E. G. Brown (Vice-Chairman of the Committee), who referred to the remarkable progress which has been made in the gas services in Chelmsford, under the capable Gas Engineer, Mr. F. N. Howes, M.C.

The Mayor, in declaring the Exhibition open, said that for long enough, he thought, the Gas Undertaking had been hiding its light under a bushel. It was interesting to recall at that Exhibition, where they could see all the latest cooking apparatus in the Gas Industry, that cooking by gas was demonstrated for the first time at Chelmsford in 1881, when an Exhibition was held in the Corn Exchange. He quoted interesting extracts from the lengthy report which appeared in *The Essex Chronicle* at that time describing the features of that Exhibition, and mentioned that the Davis Gas Stove Company, which co-operated on that occasion, were also doing so in the present Exhibition. The Mayor recalled that gas was first made in Chelmsford in 1819, in the reign of George III. Each year saw a further gradual development. In 1918 the Corporation acquired the Undertaking. Since then, and especially during the last few years, the use of gas had continuously expanded, and now nearly a million cubic feet were consumed by the homes and industries of Chelmsford and district during a busy day.

His Worship claimed that the policy of the Gas Undertaking in Chelmsford was to provide the best service possible in the interests of the consumer—that was their one ambition. While the ownership of the Undertaking was vested in the ratepayers, no contribution was made to the rates, nor was any assistance ever required from that source. All profit made as the result of this branch of municipal trading was returned to the user of gas, either in reduced charges, or improved service. To this end the price of gas had been four times reduced during the past five years, and the charge for meters and cookers had been decreased to a nominal figure.

With the rapid growth of the town and returning prosperity, the increase in the gas consumption might be expected to continue. The Corporation recently embarked on a policy of reconstruction of their works and mains, and a reliable supply of constant quality and pressure was available for all purposes. It was hoped that this service might be further extended to meet the requirements of surrounding parishes in the near future. The Mayor paid a tribute to the excellent work of the Gas Engineer and his staff, who were showing the public at that Exhibition how the use of gas resulted in the saving of trouble, temper, money, and worry.

Mr. F. H. Swain, of Radiation, Ltd., voiced thanks to the Mayor, observing that the Chelmsford Gas Undertaking was to be congratulated upon a very progressive policy.

A programme of sound films followed, including "The Man who Knew Too Little," "How Gas is Made," "Famous Cooks at Work," and the Nutrition film.

Mrs. E. K. Slack (First-Class Diplomée, N.S.T.C., of Radiation Research Kitchen) gave a series of gas cookery demonstrations during the Exhibition, and a cake-baking competition open to Chelmsford Gas Department's consumers was arranged, with valuable prizes for the winners.

## Wigan's New Gasholder

### Inaugural Dinner

Moving the Toast of "The Contractors," at the dinner which followed the official inauguration of Wigan's new 2 million cu.ft. gasholder (reference to which was made in these columns last week), Councillor T. Brady (Vice-Chairman of the Gas Committee) spoke of the long standing association between Messrs. R. & J. Dempster, Ltd., and the County Borough of Wigan, and he paid tribute to the manner in which the work had been carried out.

In the absence of Mr. J. W. Scott (who was a victim of 'flu), Mr. F. J. Siddall responded on behalf of the Contractors and thanked the mover of the Toast for his kind remarks. He wished the Borough every success in the future, and hoped that the new gasholder would give useful

service. The holder inaugurated that day was completed just in time to meet their heaviest demands. It was of interest to know that the firm's first contract for the Wigan Corporation was in connection with the erection of the roof of their retort house which was built about 1885. This roof was 350 ft. long and about 100 ft. span.

The spiral gasholder, went on Mr. Siddall, was patented by a Manchester man and developed by a Manchester firm. In the old days it was the custom to erect elaborate framework to support the moving gasholder; the Gas Industry then refused to adopt the spiral gasholder which appeared to have no visible means of support. To-day, however, it was generally recognized that the spiral gasholder was as strong as any other type of gasholder. It might be of interest to the Council to know that there were upwards of 400,000 rivets in the gasholder and 12,000 bolts.

It had been a pleasure to work with their Engineer, Mr. J. Monks, and his staff in the erection not only of the gasholder, but also of the benzole plant and other work with which the firm had been entrusted. On behalf of the firm he represented, he again thanked the mover of the Toast and wished the Borough of Wigan Gas Undertaking every success; and as a small souvenir of the occasion, he asked the Chairman and Deputy-Chairman of the Gas Committee to accept appropriately engraved silver trays.

The recipients briefly responded, and a Toast to the "Gas Committee, its Officials and Employees" was moved by Alderman H. Farr, J.P., to which the Chairman and the Gas Engineer replied.

## Woodall-Duckham Work in 1936

### A Review of Developments

The intense activity reported by the Woodall-Duckham Company a year ago has been well maintained during 1936. The total capacity of "W-D" carbonizing plants ordered during the year was 5,475 tons of coal per day, or just on 2 million tons per annum.

Orders have been placed with the Company for new installations of "W-D" continuous vertical retorts by the Gas Undertakings in the following places in Great Britain: Alloa (97 tons per day); Ascot (2nd installation: 10 tons per day); Campbeltown (20 tons per day); Cleckheaton (3rd installation: 52 tons per day); Dunstable (two installations: 37 tons per day each); Edinburgh (3rd installation: 280 tons per day); Elland (36 tons per day); Linlithgow (8 tons per day); Penzance (30 tons per day); Prestatyn (17 tons per day); Rowley Regis (2nd installation: 12 tons per day); Saltcoats (2nd installation: 11 tons per day); Solihull (74 tons per day); Warrington (3rd installation: 80 tons per day).

Other orders for new "W-D" continuous vertical retort installations include one placed with the Company by Imperial Chemical Industries, Ltd., for a plant at Modderfontein, South Africa (16 tons per day), this contract also comprising complete gas-works equipment; one received by Woodall-Duckham (Australasia) Pty., Ltd., for a plant at Sydney, N.S.W. (210 tons per day); and one for a second installation at Aalborg, Denmark (38 tons per day), secured by Didier-Werke A/G.

Several orders have been received for complete modernization of existing installations which have reached the end of their useful life. These are being replaced by upwardly-heated retorts of the latest design, and in most cases six modern retorts are being built in the place of each existing setting of four. This type of work has been commissioned for Birmingham (Swan Village Works: 155 tons per day); Odense, Denmark (38 tons per day); Rochdale (180 tons per day); the Gas Light and Coke Company (Fulham Station: 338 tons per day); Bradford (198 tons per day); Hinckley (119 tons per day); Liverpool (207 tons per day). The total increase in capacity of these plants is from 829 tons per day before reconstruction to 1,235 tons per day after reconstruction.

Of the orders mentioned above, the plants at Ascot, Campbeltown, Linlithgow, Odense, Rhyl, and Solihull are already at work, while many other plants ordered in 1935 were put into operation during 1936, including new installations at Ilkeston, Loughborough, and Birmingham (Windsor Street Works), and plants reconstructed to upward heating at Aberdeen, Dundee, Liverpool, Nottingham, Odense, Walsall, and Wolverhampton.

An order has been placed for a "W-D" intermittent vertical chamber installation for Weston-super-Mare (109 tons per day), and an installation of these chambers at Epping has been put to work.

In addition, a number of orders were received for resetting gas-works carbonizing plant on existing lines.

### Coke Oven Installations

The Company has received six orders for "W-D" Becker coke oven installations. A second battery of 23 ovens has been ordered by John Lysaght, Ltd., to be erected at their Normanby Park Works, where there is already a battery of 47 Becker ovens. This contract includes extension of the by-product and benzole plant. The new ovens will have a capacity of 520 tons of coal a day. Stewarts & Lloyds, Ltd., through their consulting engineers, H. A. Brassert & Co., Ltd., ordered during 1936 a third battery of Becker ovens for their Corby Works as well as the addition of six ovens to the second battery ordered in 1935. The new battery will consist of 21 ovens, with a total daily capacity of 450 tons of coal a day, and the six new ovens on the second battery will raise its daily capacity by 128 tons of coal. When these additions are completed there will be 113 Becker ovens at Corby with a total nominal daily capacity of 2,400 tons of coal. The largest coke oven contract placed in this country during 1936 was received by the Company when Richard Thomas & Co., Ltd., ordered for their Ebbw Vale Works a comprehensive plant including a battery of 65 Becker ovens with by-product and benzole recovery plant and coal handling, blending and crushing, and coke handling and screening equipment. This plant will be capable of a daily throughput of 1,370 tons of coal. The Waleswood Coking Company, Ltd., placed an order for a battery of 23 Becker ovens with a capacity of 267 tons of coal a day; this contract includes by-product and benzole recovery plant and boosters for a town's supply of gas. The Nunnery Colliery Company also commissioned an installation of Becker ovens, consisting of 22 ovens with a daily capacity of 330 tons of coal.

In addition to the above orders, two large Becker oven installations both with comprehensive ancillary equipment were completed during the year, one (comprising 53 ovens) at the works of the Workington Iron and Steel Company (United Steel Companies, Cumberland Group) and the other at the works of the Barnsley District Coking Company, Ltd. (51 ovens). A further comprehensively equipped plant, including 59 ovens, is nearing completion at the works of Brancepeth Gas and Coke (Strakers & Love), Ltd.

Twenty-two "W-D" waste-heat boilers were ordered during the year, of which nineteen were to be installed as part of contracts mentioned above, while boilers were ordered to work with existing "W-D" continuous vertical retort installations at Newbury and Crieff and with existing horizontal retorts at Wandsworth.

An order for a T.I.C. complete tar distillation plant was received by the Company from John Miller & Co. (Aberdeen), Ltd., for their Sandilands Chemical Works. Further orders for T.I.C. complete tar distillation plants were received by Woodall-Duckham (Australasia) Pty., Ltd., from Duratar Pty., Ltd., Footscray (Victoria), from James Forbes Pty., Ltd., Melbourne (Victoria), and from the Australian Chemical Company, Brisbane (Queensland). During the year a T.I.C. plant for the redistillation of tar oils was put into operation at the Mortlake Works, Sydney, of the Australian Gas Light Company. A bitumen melting plant was ordered by the Boston Gas Light and Coke Company to work in conjunction with their existing T.I.C. tar plant.

The standard type "W-D" crude benzole recovery plant ordered by the Salford Gas Department in 1935 was put into operation during 1936, and a further plant of this type, but including also a Barbet type rectifying plant, was ordered by James Nimmo & Co., Ltd., for erection at their Auchengeich By-product Works. Barbet type distillation plants for continuous removal of carbon disulphide from crude benzole were ordered by the Cargo Fleet Iron Company and by the United Steel Companies for their Orgreave By-Product Works, the latter plant having been put to work during the year.

## Midland Coke Research Committee

### Report of Progress During 1936

The Midland Coke Research Committee, which was formed in 1926, is financed by grants from the producers and users of blast furnace coke made in the Midland area, supplemented by a grant from the Department of Scientific and Industrial Research which is administered by the Industrial Research Council of the British Iron and Steel Federation.

The objects of the Committee are to study and evaluate the properties and qualities of coke, to standardize methods of assessing its properties, and to determine means of improving its qualities. The properties of coke with respect to its use in blast furnaces, and for other metallurgical purposes have been the main concern, but the use of coke for domestic purposes is now also receiving attention.

The experimental work of the Committee is carried out under the direction of Prof. R. V. Wheeler in the Department of Fuel Technology of Sheffield University and

at neighbouring coke oven and blast furnace plants. The constitution of the Committee during 1936 was:

| | Representing. |
|---|---|
| W. J. Brooke (Chairman) | Lincolnshire Ironmasters Association. |
| A. Crooke | |
| H. H. Jackson | Midland Association of Blastfurnace Owners. |
| R. Sharp | |
| J. Crawford | Messrs. Stewarts & Lloyds, Ltd. |
| J. Mitchell | |
| G. S. McLay | |
| T. W. Brameld | Parkgate Iron and Steel Co., Ltd. |
| J. Sinclair Kerr | Lancashire Steel Corporation, Ltd. |
| A. C. F. Assinder | Monckton Coke and Chemical Company, Ltd. |
| W. F. Carr | Manvers Main Collieries, Ltd. |
| W. Eland | Richard Thomas & Co., Ltd. |
| C. R. Ellis | Blackwell Colliery Company, Ltd. |
| P. W. Ellis | Dinnington Main Coal Company, Ltd. |
| G. J. Greenfield | Thorncliffe Coal Distillation, Ltd. |
| A. G. McTurk | Barber, Walker, & Co., Ltd. |
| F. W. Middleton | Old Silkstone Collieries, Ltd. |
| N. E. Webster | Nunnery Colliery Company, Ltd. |
| T. E. B. Young | Bolsover Colliery Company, Ltd. |
| E. S. Grumell | Imperial Chemical Industries, Ltd. |
| E. C. Evans | British Iron and Steel Federation. |
| F. S. Sinnatt | Fuel Research Division of the Department of Scientific and Industrial Research. |
| J. E. Fletcher | British Cast Iron Research Association. |
| J. G. Pearce | |
| A. Blenkinsop | South Yorkshire Coal Trade Association. |
| P. B. Nicholson | |
| G. T. Purves | |
| G. W. J. Bradley | Coke Oven Managers' Association. |
| G. A. Hebden | |
| John Brass | South Yorkshire Survey Committee of the Fuel Research Board. |
| R. Clive | |
| L. Slater | |
| H. E. Blayden | Northern Coke Research Committee. |
| H. L. Riley | |
| W. Davidson | Scottish Coke Research Committee. |
| C. P. Finn | " |
| J. H. Andrew | University of Sheffield. |
| R. V. Wheeler | |
| W. M. Gibbons (Treasurer) | |
| R. A. Mott (Secretary) | |

The following firms also contribute to the funds of the Committee: Cortonwood Collieries Company, Ltd.; Tinsley Park Colliery Company, Ltd.; United Steel Companies, Ltd.; Rothervale Collieries Branch; J. & J. Charlesworth, Ltd.; Yorkshire Coking and Chemical Company, Ltd.; Lancashire Foundry Company, Ltd.; Barrow District Coking Company, Ltd.; Waleswood Coking Company, Ltd.; Wharncliffe Silkstone Collieries Company, Ltd.; Ingham's Thornhill Collieries, Ltd.; South Yorkshire Chemical Works, Ltd.; Tinker Bros., Ltd.

The staff, under the supervision of R. A. Mott, D.Sc., F.I.C., was: Senior Assistant, J. Hiles, M.Sc., A.I.C.; Assistants, D. F. Marshall, Ph.D., B.Sc.Tech., C. E. Spooner, B.Sc.Tech. (Hons.), W. Brewin, J. Hodgkinson, F. Frith, and W. Thompson.

### Publications during 1936.

(1) Report of Progress during 1935. *Fuel in Science and Practice*, 1936, 15, 87.

(2) "The Use of Coke for Domestic Purposes." Paper presented to the West Cumberland Society of Chemists and Engineers. *Fuel in Science and Practice*, 1936, 15, 77.

(3) "The Cleaning of Coal Using 'Dense Media.'" R. A. Mott, *Journ. Inst. Fuel*, February, 1936.

(4) "Coking the Barnsley Seam II." R. A. Mott and R. V. Wheeler. Trans. Inst. Min. Eng., 1936, 90, 318.

(5) "The Cochrane Test" for Testing the Abradability of Coke. *Fuel in Science and Practice*, 1936, 15, 233.

## Proposed Extensions at Renfrew

### To Meet Bulk Demand

Mr. D. S. Munn (Engineer and Manager of the Renfrew Gas Department) has submitted a report to the Town Council foreshadowing an extension of the gas-works. The matter arose through an enquiry from Messrs. Babcock & Wilcox, Ltd., for a regular supply of a large quantity of gas for their works.

In his report Mr. Munn states that Messrs. Babcock & Wilcox require a continuous average minimum supply per hour for a 24-hour day, including week-ends, and a further weekly supply to cover three periods lasting for eight hours each. The total for the dual requirement for the new furnaces is a minimum of 37,500,000 cu.ft. per annum.

To supply the needs of Messrs. Babcock & Wilcox, states the report, an extension of the vertical retort plant would be necessary and also of the washing plant, while gasholder storage would require to be considered to meet an intermittent demand load.

In estimating the capacity of the gas mains carrying supply to the works of Messrs. Babcock & Wilcox, Ltd., a number of observations were taken at one-hour, two-hour, and four-hour periods at the various points. The maximum hourly consumption, including the testing of the furnace in the old foundry, was 6,000 cu.ft., the carrying capacity of the mains to the works being estimated at 5,700 cu.ft. per hour. The existing mains can therefore only meet the present and not the future demand.

A committee has been appointed to consider the present capacity of the works and future needs in view of the situation.

## The Cheshire Cat Causes Trouble

### Dog Attacks Realistic Window Display

The realism of a display arranged by the Guernsey Gas Light Company, Ltd., in their showrooms had rather amusing consequences recently, when quite a large number of people were attracted by what to all appearances was a particularly savage dog fight.

Investigation showed that the howls and barks were emanating from a black cocker spaniel who was hurling himself against the showroom window from the outside, attempting to stage a fight with a large cardboard cat which was lying contentedly in front of a fire. "No amount of reasoning," concludes the account in the *Guernsey Star*, "could induce Micky (or was it Paddy?) that his arch enemy was only an imitation, and therefore not worth his attention."

The object of the dog's attack, as a matter of fact, was the Radiation display featuring the Duchess, complete with howling baby, sitting beside a gas fire, with the Cheshire Cat smiling in the foreground—an excellent reproduction of the well-known figures from "Alice in Wonderland." Alice herself is interrogating the Duchess, according to an adjacent card, which reads:

"Please would you tell me," said Alice a little timidly, "why you don't light your lovely gas fire this cold day?"

"I don't light it," snapped the Duchess, "because it lights itself!"

"I didn't know gas fires *could* light themselves," Alice went on.

"Then you don't know much," said the Duchess; "it's a 'HIGH BEAM' gas fire!"

It may, of course, have been the Cheshire Cat's famous grin which so infuriated Micky (or was it Paddy?). It is enough to annoy the best-tempered dog to be grinned at by a cat he can't get at. We feel that the cat would have done the proper thing when it became aware of the dog's savage intentions if it had executed its celebrated fade-out—and left the spaniel to out-howl the baby!

## Popularizing Gas in the Outlying Areas

### Edinburgh Exhibition

At the opening of an Edinburgh Corporation Gas Department exhibition in the Town Hall, South Queensferry, last week, Councillor W. Duncan, Convener of the Gas Department, said it was the intention of the Corporation to popularize the use of gas to the greatest possible extent in the outlying areas. Gas appliances to-day could take their place with the most attractive household equipment.

Provost Walker, in declaring the exhibition open, said they already appreciated the excellent service which was being given to South Queensferry. He was extremely glad that the old gas-works had been closed down, and hoped in future that the Corporation of Edinburgh would make available the site of the old works for a public improvement of the foreshore.

Already the residents of South Queensferry had felt considerable financial benefit from the change which had recently been made in the source of the gas supply. He looked forward to further reductions in price, and assured them that they had the heartiest support of his Council.

## Technical Data on Fuel

### Fourth Edition: Second Impression

After exceptionally heavy sales during the past few weeks, the whole of the first printing of the fourth edition of "Technical Data on Fuel," published in December, 1935—only just over a year ago—is now exhausted. The number printed was considerably larger than in the case of previous editions.

We are informed by the British National Committee of the World Power Conference that there is a rapidly increasing sale in the United States of America, and the book has been adopted by fuel technicians in a large number of other countries, in addition to Great Britain and U.S.A.

It is proposed to print a second impression of the fourth edition, equal in number to the first impression, in preference to publishing a fifth edition at this stage. It is not anticipated that a new edition will be published before 1939.

# THE COLONIAL GAS ASSOCIATION'S

## Fine New Showrooms at

# Box Hill

**The Colonial Gas Association's new Showrooms and Offices, at 944, Whitehorse Road, Box Hill, opened last October, are among the most modern and completely appointed premises of their kind in Victoria.**

A General View—looking from the Front right through to Entrance to Home Service Auditorium.

The main showroom, which may be seen direct from the street through the plate glass shop front, is panelled throughout with horizontally grained walnut veneer, relieved with horizontal strips of ebony and a lighter-coloured wood, with a pronounced vertical grain known as "Zebrano" wood. A novel feature of the panelling is the sand-blasted pattern on the east wall, symbolizing the Gas Industry. At a height of 9 ft., and projecting 4 ft. from the walls is a false ceiling running completely around the showroom, with flush panel lights for illuminating the displays around the side walls. Above this the main ceiling rises to a height of 15 ft. and is lighted by means of a cove light running around the room. On each of three walls of the showroom is a modern panel gas fire. One of these fires is surrounded by built-in furniture to represent a small lounge with bookshelves and cupboards on either side of the fireplace, and a comfortable lounge settee. Opposite this is the enquiry and accounts desk, which is also panelled to match the remainder of the showroom. From the main showroom may be seen the display of bathroom and kitchen gas heating units in their correct settings along one wall of the rear showroom, while on the other are arranged various types of gas fires.

In a small alcove opening off the showroom is a complete "Payne" gas air-conditioning system actually in operation, visible through large sand-blasted plate glass doors.

The bathroom display consists of four different models of gas water heaters of the storage and instantaneous types, completely enclosed in small cupboards with doors glazed in ¼ in. plate glass to enable the complete operation of the various types to be easily seen and demonstrated.

The whole of the bathroom has been finished in green and black "Vitrolite" structural glass with a sand-blasted glass panel, carrying an "aquatic" motif above both the bath and basin. Next to the bathroom is a completely equipped stainless steel sink with cupboards beneath. Above the sink are several types of small gas water heaters, while alongside are representative gas bath heaters and a de luxe model square-panelled gas wash copper.

Through an open archway is the reserve showroom, wherein are displayed the various models of gas fires, stoves, refrigerators, &c., not to be seen in the front showrooms.

On the south wall of the reserve showroom, up a short flight of steps, is the Home Service Auditorium, arranged in the form of a small lecture theatre with seating accommodation for 110 persons. The seats, which are of the fixed type, similar to those in use in theatres, are upholstered in green leather, and are so placed on a floor sloping down to the stage that, from any position in the theatre, a perfect view may be obtained of the demonstration. On the stage is an elaborately equipped kitchen, with two stoves for use in cookery demonstrations, and a gas refrigerator. General offices are located above the showroom, together with mess room for the staff, and a small, compact and yet well-equipped cookery class room.

### The Official Opening.

The official opening of the building took place on Oct. 23, when the Mayor of Box Hill declared the premises open for business. Those present chiefly comprised civic authorities and C.G.A. executives, the "official" party being the Mayor and Acting Mayoress of Box Hill (Councillor W. F. Young and his daughter, Mrs. D. Rodgerson), the Directors of the Association (Mr. P. C. Holmes Hunt, Sir Arthur Robinson, and Sir Stephen Morell), Mr. and Mrs. E. O. Tipper, and the Architect for the building, Mr. Maurice King, of Messrs. R. M. & M. H. King.

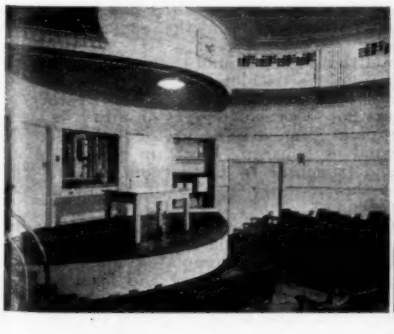
In welcoming the guests, Mr. Hunt reviewed the association of the C.G.A. with the Box Hill district. Box Hill was a very small place, he said, when the Association first established its works there, but it had grown remarkably, and with it the gas-works had also grown. When they commenced operations they had a few miles of main and about 100 customers. To-day they had just on 100 miles of main and nearly 9,000 customers. The Directors decided that to meet the growing demands of the district served by the Box Hill Gas-Works, a first-class showroom and demonstration theatre should be established, and, further, that any building which the Association erected in Box Hill should conform to the high architectural standard set by the Box Hill Council in its Town Hall and Municipal Offices, and by many public buildings in the district. It was a red-letter day in the Association's history, said Mr. Hunt, and a milestone in the progress of gas supply to the district.

The Mayor thanked the Chairman and Directors of the Colonial Gas Association for their invitation to be present, to play some part in the opening of the new building.

He was glad of the opportunity of mentioning that the Colonial Gas Association had given six gas ranges, of an aggregate value of £100, to the Girls' Technical School.

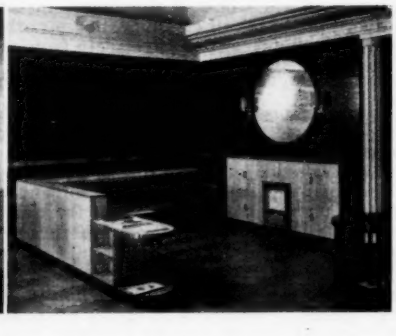
He was very pleased at the standard of excellence in outward design and interior finish of the new C.G.A. buildings, and he was sure that every Box Hill citizen would take a personal interest and pride in it. The Colonial Gas Association was to be most heartily thanked for its enterprise and public spiritedness. It was a pleasure and a privilege for him to declare the building open.

After tea, visitors were shown over the building, when officers specially detailed were available to explain the operation of the various appliances.



Platform of Home Service Auditorium.

Hot Water Section, showing K.C.U. and B.T.U. and Multi-Point Royal Instantaneous Water Heaters.



A Corner of the Front Showroom.

# The Degreasing of Metals

## PRIOR TO VITREOUS ENAMELLING

by
**Dr. N. R. HOOD**

**The theory and practice of metal degreasing were reviewed by Dr. N. R. HOOD in an interesting Paper given before a meeting of the Institute of Vitreous Enamellers at Imperial Chemical House on Friday evening, Jan. 15. His lecture dealt especially with modern non-inflammable solvent methods.**

Under modern conditions, said Dr. Hood, the manufacture of even the simplest metal article entailed the contamination of its surface with oil and grease, the removal of which, as completely as possible, was essential before such finishing processes as plating, painting, or vitreous enamelling could be applied. Degreasing methods were described by Dr. Hood as being of three distinct classes: Mechanical, such as simple wiping or sand blasting; destruction of the grease by burning off; and chemical, using either alkalis or organic solvents. This last class had the widest application in modern industry.

Mechanical methods, so far as vitreous enamelling was concerned, was limited to surfaces such as cast iron, the porous nature of which prohibited the use of alkalis and solvents. The desired cleaning was carried out by sand blasting, which at the same time removed blemishes and irregularities from the cast surface. Burning-off could not be applied to surfaces likely to suffer deterioration by oxidation, and in vitreous enamelling it was limited to the treatment of close-beaded work, where it had certain definite advantages over other methods. It was the only satisfactory method of getting rid of the lubricant used in the turning over of the sheet. It also served the double purpose of degreasing and annealing after the beading operation. At the same time, the resultant loosening of oxide scale and rust simplified the subsequent pickling process, but against this advantage had to be placed the corresponding increase in the time of pickling and consumption of acid.

Chemical methods, employing alkalis and solvents, were much more general in application than either of these two methods. They depended upon immersion and/or spraying of the dirty articles in a bath containing the solvent or alkalis in hot aqueous solution.

### Alkali Degreasing.

Alkali baths depended for their degreasing and cleaning efficiency on the fulfilment of four main requirements. First, high wetting and penetrative power, which in turn depended on the lowering of interfacial tension between the dirt particles, the oil, and the metal; secondly, high emulsifying power, which was essential when dealing with mineral oils which could not be saponified in the ordinary way; thirdly, the ability to maintain solid particles of dirt in suspension; and, fourthly, ease of rinsing. Soap was the cheapest and most economical material for ensuring the fulfilment of the first three of these conditions. Trisodium phosphate was commonly added to alkaline cleaning mixtures for ease of rinsing. In general, mixtures of alkalis such as caustic soda, sodium carbonate, sodium silicate, sodium phosphate, and soap would satisfy the above conditions for the type of cleaning required prior to vitreous enamelling. Cleaning efficiency was not directly proportional to the strength of the alkaline solution. The most useful range of strengths was from 1-4%.

The dependence of uniformly efficient cleaning upon the fulfilment of each one of the above factors was the chief disadvantage of alkali cleaning, but no other process would remove soap lubricant so effectively from soal spun work.

### Degreasing by Organic Solvents.

The use of organic solvents, continued Dr. Hood, represented the latest development in metal cleaning. In contradistinction to alkali cleaning, this method depended upon the solution of oil and grease. Since rate of solution was naturally greatest when the solvent was hot, the use of petroleum spirit or white spirit for this purpose was impracticable owing to the fire risks involved. The non-inflammable chlorinated hydrocarbon solutions, of which the best known was trichlorethylene, were almost ideal as metal cleaning agents. The simplest plants for use with trichlorethylene worked on a cyclic principle, involving the production of solvent vapour (heavier than air) by boiling. the condensation of this vapour on the cold greasy work immersed in it, and the re-evaporation of the condensed solvent. That was the principle of " vapour degreasing," which, although obviously limited by the heat capacity of the work, was sufficient in most cases to remove the whole of the grease film and to give the surface a final wash with pure solvent. For example, a piece of ⅛ in. thick iron plate, 5 ft. by 2 ft. in size, immersed in trichlorethylene vapour, would be subjected to a wash of approximately half a gallon of pure liquid solvent, which was ample for the complete removal of the usual quantities of oil and grease found on plates used in the vitreous enamelling industry. Copper and aluminium would condense smaller quantities. Plants could be designed to degrease one ton of ¼ in. thick steel plate in 15-20 minutes.

Where it was desired to remove solids at the same time as the grease, the process would have to be modified to include a wash in boiling liquid solvent. Plants for this purpose were available, so designed that the liquor bath was continually replenished with clean solvent. Such " liquor degreasing " was recommended for certain classes of metal whose open grain allows penetration of pressing oil.

### Design and Operation of Solvent Degreasing Plants.

All solvent degreasing plants incorporated some means of applying heat to the liquid, cooling coils at the top to control the vapour, means of reducing natural diffusion losses, doors for the removal of accumulated dirt and grease, and automatic control of the vapour level. Their operation was so simplified as to enable them to be run satisfactorily and economically by ordinary process labour after only a few hours' instruction.

The results obtained by this method, concluded Dr. Hood, showed a marked improvement over those obtained by any other process at substantially the same cost. For greatest economy, the plant should be operated at maximum capacity. To obtain a true comparison on a cost basis, consideration had to be given to the increased output and general efficiency of the process, and to the more uniform results obtained over any given period.

## Discussion.

In opening the discussion, the CHAIRMAN (Mr. Faulkner) said that throughout the Paper, when referring to lead shot, he was sure that what the Author had actually meant was chilled iron. He observed that he would like a more exact definition of what was meant by " dirt."

Mr. W. H. WHITTLE said the Author had not sought to impress them with the advantages of one system as compared with another, and he could endorse all that Dr. Hood had said. He thought that the removal of grease by burning gave rise to considerable difficulty when the articles to be cleaned had been cold set. Other methods had their advantages and disadvantages.

Mr. GRAY, who had had experience of the trichlorethylene process, asked Dr. Hood if he could give any reason for " streaking " on some articles. An expert had been in charge of the operations, and the subsequent pickling had been carried out correctly. This " streaking " on the sheets was of a greenish tint.

Mr. J. H. COUPE said that he had found that when sheet metal plates were removed from the trichlorethylene process, and left for any time, rusting took place. In damp hot weather the action in the bath was not so satisfactory as on a dry day. He had found that the plant removed the grease but where the metal had been ground or polished, a certain amount of grit was left which was detrimental to further operations. They would prefer to put the material in a bath of solvent after trichlorethylene processing.

Replying to Messrs. Faulkner, Whittle, Gray, and Coupe, Dr. HOOD said that as regards the first question, " dirt " could be defined as anything which had accumulated and was held to the metal by grease. When the grease had been removed then the dirt could be brushed off easily. Plant could be devised in which the degreased metal could be placed in a violently boiling liquid which removed the dirt to a sufficient degree. This was not due to the fact that the solvent acted on the dirt but that it removed the bond which held it to the metal. He

agreed that hydrofluoric acid was one of the best liquids for the cleaning of castings, but he was not prepared to argue on its merits as a degreaser. As regards the "streaking" of work, he had certainly met that phenomenon in the case of "Armco" iron sheet, which he had discovered had a very open grain. He thought that the "streaking" was due to oil going into the interstices of the metal. On the question of solvent remaining in "cups" in the metal, it did not matter how long the article was left in the bath, the solvent could not be removed. For small articles it was best to arrange for the rotation of the work. Where there were depressions in the metal, the solvent remaining in the cup so formed became greasy and so ceased to do its work. He thought that the best method was to treat the article with trichlorethylene first and then with alkali. The alkali should certainly not be used before the trichlorethylene. In reply to Mr. Coupe he agreed that rusting would take place very rapidly after trichlorethylene, especially if the atmosphere were humid. This was due to the fact that the metal was devoid of any protecting coat of grease, and if one were to examine the surface with the aid of a microscope, it would be possible to see the oxidation taking place, so rapidly did it occur. There should, therefore, be a minimum of time between the degreasing operations and the subsequent processing. It was essential that articles to be treated by the trichlorethylene process should be perfectly dry. He then went on to refer to dangers attending the use of trichlorethylene near gas flames. If the vapour passed through a gas flame, it was converted into sulphuric acid which might lead to very serious results. He mentioned this because he had come across a case where the workmen had removed some of the trichlorethylene and had left it near a gas flame, and the plant had been blamed. Trichlorethylene would not remove graphite, and in that case the boiling liquid process should be used.

Mr. E. O. ROUNSEKELL, B.A., B.Sc. (Alkali Group, I.C.I.), gave some useful information on the question of suitable alkalis for degreasing, pointing out, however, that the alkali used must depend on the type of grease to be removed.

Dr. HOOD concluded by pointing out that trichlorethylene was not toxic. It had a suffocating effect merely because it deprived the lungs of the essential oxygen. If a person were overcome by the vapour then all that was necessary for his recovery was to remove him to fresh air.

# Trade Notes

## Old Silkstone Chemical Works, Ltd.

As from Jan. 1, 1937, the Registered Office and Sales Staff have been transferred from Whitechapel Road, Cleckheaton, to Dodworth, near Barnsley, where all communications should be addressed. Mr. J. Thorp continues as Works Manager; Mr. F. Walton Middleton has been appointed Commercial Manager, and Mr. Alfred Levitt, Secretary.

## "Cromastic" Lastic Waterproofing Composition.

Particulars of a new waterproofing material have been sent to us by Mr. Fred B. Crow, M.Inst.P.T., "Cro-Clean" Works, Harts Lane, Barking, Essex. "Cromastic" Lastic, which we are informed is being used by gas undertakings for coating asbestos lagging to preserve and protect it against adverse atmospheric conditions, is a bitumen base plastic composition which when allowed to dry sets hard, but, it is claimed, is never brittle. Taking the place of felt, wire netting, and varnish, it is easily applied cold with the hands and finished off with a trowel or a plasterer's float. Free samples and prices will be readily supplied by the manufacturer.

## "Turnall" Asbestos Reinforced Aluminium Foil.

From Turners Asbestos Company, Trafford Park, Manchester, we have received a copy of their illustrated publication dealing with their latest product—asbestos reinforced aluminium foil. To-day the manufacturers state there is an increasing need for an efficient low-priced insulating material for use in building construction, which shall be at once light in weight, convenient to handle and apply, and durable in performance. To meet this need, "Turnall" asbestos reinforced foil has been introduced after very considerable experiment and exhaustive testing under laboratory and field conditions. The high insulating qualities of the material depend upon three of the fundamentals of physics—viz., that radiant heat is not readily absorbed by a polished surface, that a bright metallic surface is a poor emitter of radiant heat, and that air is a superior heat insulator.

There are a great variety of purposes to which this material can be put in building construction, such as the insulation of roofs, walls, and floors.

## Determination of Nitric Oxide Concentration.

We have received from the Integra Company, Ltd., of 183, Broad Street, Birmingham, a copy of their Bulletin No. 450 entitled "Apparatus for Determining Nitric Oxide Concentration in Manufactured Gas." This apparatus, which has been developed by the United Gas Improvement Company of America, is manufactured by the Rubicon Company, of Philadelphia. The Rubicon Company has recently entrusted the Integra Company, Ltd., with their agency in Great Britain.

Briefly, the method consists in mixing a measured quantity of the gas to be tested with a definite amount of commercial oxygen in the presence of butadiene which acts as a catalyst. The nitric oxide present in the gas is thereby oxidized. The mixture is then brought into intimate contact with a measured amount of Griess solution which reacts with the oxidized NO to form an azo dye. In this process the Griess solution assumes a characteristic colour which varies from a light pink to a purple red, depending upon the amount of nitric oxide originally present in the sample of gas. Measurement of colour depth can be made either manually or automatically. The results can be registered on a chart as grammes of nitric oxide per million cu.ft. of gas.

The U.G.I. nitric oxide recorder is claimed to be the only instrument which gives a continuous record of the concentration of nitric oxide and which affords a continuous check on the functioning of the preventive treatment.

## An Interesting Butterley Catalogue.

A new catalogue just issued by the Butterley Company, Ltd., of Derby, gives a most interesting account of this firm's many activities, with a large number of excellent illustrations showing the wide variety of their products.

The Company was founded in 1790 to operate, on the Butterley Hall Estate, coal workings which had existed for a long time before that date. Two years later the Butterley Ironworks were erected—and so began the twin enterprises which to-day form the main activities of the Company. Events soon coupled the destiny of the concern with the development of transport methods, and many notable engineering feats are associated with the firm, among which the famous roof of St. Pancras Station stands out as a unique achievement in constructional engineering, with its 240-ft. tied arch, unhampered by intermediate supports. This is but one of an immense variety of constructional works undertaken by the Company at home and abroad. Among those overseas may be mentioned the Godavari Bridge, with a total length of 9,096 ft., which is illustrated in the catalogue. Another pioneering feat was the invention of the rolling-in method of erecting bridges, now much in favour for rapid construction with a minimum of interference with traffic.

To-day the Butterley Company has nearly 10,000 employees, engaged in a variety of widespread activities, including one of the largest colliery undertakings in Derbyshire and Nottinghamshire. There are in all nine pits, mining good house, gas, coking, steam, and industrial coals, the output capacity on single coal turning shifts being upwards of 4½ million tons per annum.

Among the many products of the firm illustrated in the catalogue are bridge sections, coke pusher and door extractor gear for coke ovens, welded steel condensers, tilting furnaces, colliery haulage gear, cast-iron flange pipes, venturi meter tubes, bedplates, baseplates and ashpans for water gas sets; manhole covers and frames, colliery tub and railway wagons, and all-steel lorry bodies. Many interior views of the firm's constructional shops are given, and of particular interest to the Gas Industry is a photograph of a 5 in. gas main recently excavated in High Street, Stamford. The pipes were made by the Butterley Company and were laid in 1825—no less than 111 years ago; and they are still sound!

# Gas Undertakings' Results

## Perth (Australia).

The Report of the operations of the Perth (Australia) Gas Department for the twelve months to Sept. 30, 1936, states that the quantities of gas manufactured and sold were as follows: Gas manufactured, 373,781,000 cu.ft. in 1935, 400,654,000 cu.ft. in 1936, being an increase of 7·19%; gas sold, 336,039,782 cu.ft. in 1935, 358,832,164 cu.ft. in 1936, being an increase of 6·78%. The average quantity of gas made per ton of coal was 18,084 cu.ft., as against 17,222 cu.ft. The maximum output of gas in 24 hours for the year was 1,348,000 cu.ft. on Saturday, July 25, 1936, as against 1,215,000 cu.ft. on Saturday, June 22, 1935. The number of meters increased from 20,420 to 21,804, or 1,384 for the year. The mains laid during the year totalled 21,301 yd. The total length of mains laid to date is 625,352 yd., or 355·314 miles.

# Baffler Performance

## IN RELATION TO THE SAFETY OF GAS APPLIANCES

By
T. J. LEGG, B.Sc. (Lond.)
*(Messrs. R. & A. Main, Ltd., formerly of the Gas Light and Coke Company, Watson House), and*
T. G. NOBLE, B.A. (Oxon.), A.M.I.H.V.E.
*(Gas Light and Coke Company, Hot Water and Ventilation Laboratory, Watson House).*

A Paper read before members of the London and Southern District Junior Gas Association at a meeting held at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C. 1, on Friday, Jan. 22—the PRESIDENT (Mr. R. Summerson, of Luton) in the chair.

### I. INTRODUCTION.

In an age the motto of which in many spheres, from the domestic to the political, might be said to be "Safety First," it is somewhat surprising to find that, in this country at least[8-16] very few details have been published concerning the performance of bafflers or draught diverters for gas appliances, although references to their general properties are more frequent. It might be thought that either the importance of bafflers as safety devices is not fully realized, or that detailed information concerning their performance is not available. In the course of the routine testing of a large number of bafflers at Watson House, we concluded that while the chief functions of bafflers were easy to define, and were indeed generally known in responsible sections of the Gas Industry, much remained to be determined concerning the exact performance of individual bafflers. This view was confirmed by our district experience and that of our colleagues on the area served by the Gas Light and Coke Company, and amplified by information gleaned from various sources indicated in the bibliography. We were thus led to investigate several possible methods of testing bafflers, and to see how far it was practicable to state a rational basis for their design.

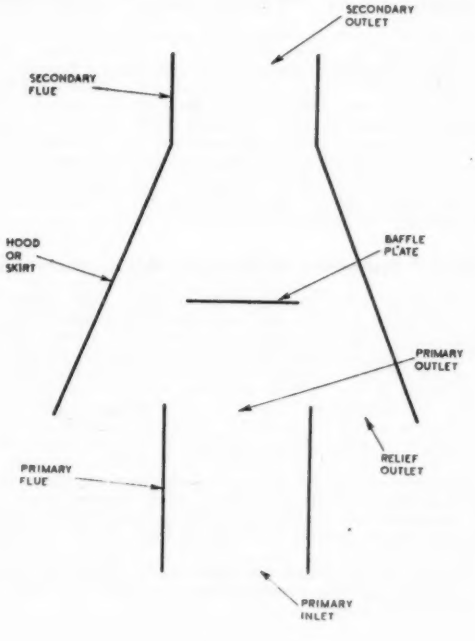
In the course of this work, which is still unfinished, we discovered—or perhaps rediscovered, since, once stated, many of the findings appear somewhat obvious—a number of facts, some peculiar to individual bafflers and some apparently more general in nature. The purpose of this Paper is to give an account of these, and to discuss generally the functions, performance, and construction of bafflers in the hope that most of you may find in it some points of interest and practical use, and that some of you will be stimulated to set to work to fill in the more important gaps in our knowledge of the subject. We have the kind permission of the British Standards Institution to mention that a draft British Standard Specification for the performance of bafflers is now being circulated for criticism; we hope that the present Paper may later also prove helpful as a sort of commentary on that specification.

We have to thank the Governors and Directors of the Gas Light and Coke Company for permission to publish this Paper, which is based upon work mostly done while both of us were in their employ, and Messrs. R. & A. Main. Ltd., for the facilities for its preparation allowed to one of us (T. J. L.) since joining them. We would also acknowledge the assistance we have received from various individuals, of whom we would especially mention Mr. J. Emerson, B.Sc., of the Hot Water and Ventilation Laboratory, Watson House, who has done much of the later experimental work.

### II. THE FUNCTIONS OF BAFFLERS.

*(a) General.*

Bafflers are designed to isolate a gas appliance from the effects of unfavourable atmospheric, wind, or draught conditions; or poor construction, faulty termination, or accidental blockage of the secondary flue,* whilst allowing the products of combustion normally to pass unhindered into the secondary flue and thence to the outside air. Of these, atmospheric or wind effects (downblow, static conditions, or excessive updraught) are the most important; it is our experience that bafflers which are a satisfactory safeguard against them are also an adequate protection against the other adverse condition mentioned, although some offer an unnecessarily high resistance to the upward flow of products under normal conditions. Other functions of bafflers, for example, the provision of some degree of room ventilation in addition to venting the appliance itself, disposal of condensation, enhancement of the appearance of the appliance, must be considered as incidental rather than essential. Bafflers are primarily safety devices; we would go so far as to say that they are the most important safety devices fitted to properly adjusted flued gas appliances.




EXPLANATORY DIAGRAMMATIC SECTION OF A SIMPLE BAFFLER

Fig. 1.

These views are elaborated below, but we take this opportunity of mentioning that we have assumed that it is unnecessary to describe in detail the various adverse wind conditions and how they may arise, since these have been discussed elsewhere.[17-31] We will only remind you that *no terminal whatsoever* (other than a completely capped flue!) *can ensure absolute freedom from downdraught in a secondary flue;* it is indeed common knowledge that, even in the tall flues venting solid fuel boilers, downdraughts sometimes occur with serious effects, though the fire is not extinguished by an intermittent downdraught as a gas flame might be. The most important of all the functions of a baffler is thus to guard the gas appliance against the effect of downdraught and we will therefore discuss this next, mentioning only incidentally that *unless the baffler is in the same room as the appliance it becomes to all intents and purposes a terminal, exposed as a terminal may be to adverse pressures and affording no certain safeguard to the appliance.*

* The flue beyond the baffler, normally connecting it to the outside air, but sometimes only to another compartment such as a ventilated roof space.

(*b*) *The Deflection of Downblow.*

As we have just stated, this is the essential purpose of a baffler. Although the products of combustion from well designed and correctly adjusted gas appliances are in themselves harmless[1-4] it is often desirable and sometimes essential to provide a flue for the normal extraction of these products to the outside air.[1-3]

Suppose, for the sake of argument, a gas appliance to be flued in the most obvious manner—that is, fitted with an unbroken flue communicating from the flue outlet on the appliance directly to the outside air, with or without a terminal (see fig. 2).

There is a variety of factors, many uncontrolled, which could cause a downblow of long or short duration to take place in this flue. For example, the terminal may be placed in an unsuitable position in relation either to the building in which the appliance itself is fitted or to adjacent buildings; the latter may have been constructed long after the flue was fitted. The terminal itself may be a bad one, or there may be another flue in the same or a nearby room with sufficient pull to reverse the direction of flow in the flue under consideration.

If the appliance fitted to the flue in which this downblow existed were a coal fire, the fire would be said to " smoke," or curses would be invoked upon the chimney for its failure to " pull." In any case the effects would be obvious and, if prolonged, so unbearable, that immediate steps would be taken to correct the situation and no real harm would result. If this were found impossible, or if, as very often happens, the only fairly certain solution to the difficulty*—viz., extension of the flue above the level of surrounding structures—is quite impracticable, the solid fuel fire would be replaced by an alternative method of heating or the occupant of the room would move elsewhere.

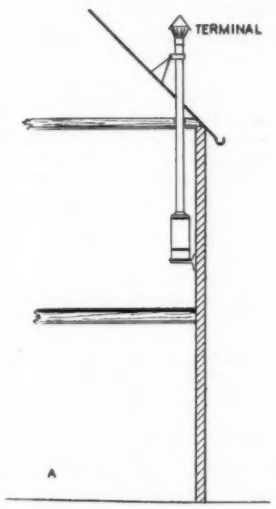



Fig. 2A.

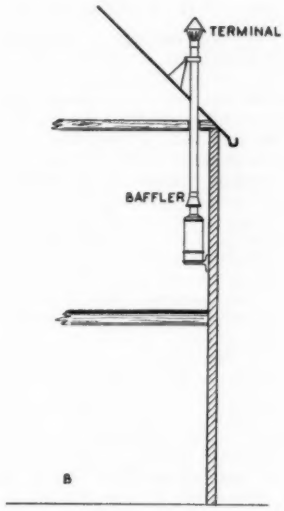



Fig. 2B.

Downblow in the flue connected directly to the gas appliance (fig. 2) has a far less obvious and more dangerous effect, causing incomplete combustion and thus a considerable discharge of carbon monoxide into the room, possibly introducing a fire hazard due to the flames licking outside the appliance, and in extreme cases extinguishing the flames and allowing raw gas to escape.

Now let us examine the consequences of the downblow if a properly designed baffler is inserted between the flue outlet of the gas appliance and the outside air, in the same room as that in which the appliance is fitted (fig. 2B). Downblow is deflected and issues from the relief outlet of the baffler together with harmless products of *complete* combustion of the gas. The combustion of the gas at the burner of the appliance remains virtually unaffected. Nothing whatever would be gained if a baffler were fitted in a similar way to a solid fuel appliance, quite apart from the fact that in many cases the latter would cease to function satisfactorily if the flue were interrupted. The products of combustion from solid fuel appliances are in themselves obnoxious—they contain comparatively high percentages of carbon monoxide and sulphur compounds and possibly smoke, soot, ash-dust, &c., the deflection of which into the room could not be tolerated.

The immediate criticism of the reasoning we have so far advanced is the reminder that downblow causes all the products of combustion to be discharged into the room. Therefore, it is often said, a flue might just as well not be fitted, especially as we have alreadv advanced the argument that the products of combustion are quite harmless. It is also pointed out, quite truly, that the carbon dioxide discharging into the room might eventually cause the carbon dioxide content of the air supply to the burner to reach such a high value that the combustion does suffer and carbon monoxide is produced in considerable quantities.[5] In addition, there is the possibility of condensation in the room, due to the water vapour in the products of combustion.

These criticisms are, in theory at any rate, justifiable. They do, however, indicate a certain lack of understanding of the problem. The question " If there is a downblow is it better to have a flue without a baffler or a flue with a baffler? " surely has an obvious answer. We reiterate that *as far as downblow is concerned the baffler should be regarded as an essential safety device.* The fact that it is fitted should not be allowed to lead to any relaxation in the efforts to lead away the products of combustion through the secondary flue; the importance of adequate dimensions for the latter, and especially of the position and manner of its termination, must not be under-estimated, but are not our present concern.

We must, however, mention that so far as we are aware there have been no instances of fatality due to the effect of downblow in a correctly adjusted gas appliance fitted with a properly designed baffler, while more general accident statistics[6] confirm that in practice the risks of accident in the conditions now being considered are negligible. These facts become clearer from considerations such as the following:

(i) It is surprisingly difficult to eliminate all air change in a room by sealing the various inlets and outlets. Even in badly ventilated rooms in which no specific provision for ventilation is made an hourly air change of half the total volume of the room takes place, while more normally 1-2 air changes per hour are found.[3]

(ii) If a downdraught exists some dilution of the products of combustion must occur at the relief outlet of the baffler as the products enter the room. It is of interest to note that, irrespective of size of room or other ventilation, a downblow of only 10 ft. per second in a 5 in. diameter secondary flue is sufficient to prevent the products of combustion of a gas appliance burning 200 cu.ft. per hour causing the $CO_2$ concentration in the room to reach 2%.

(iii) The appliance is in many cases not alight for a sufficient period to allow the carbon dioxide percentage to build up to the critical concentration, and it is only if and when this concentration has been reached that carbon monoxide in serious amounts begins to be formed.

(iv) Downblow is commonly, though not invariably, intermittent (see fig. 3 and context).

(v) Good modern appliances have a large safety combustion margin and can stand greater air vitiation than appliances with a smaller margin—*e.g.*, some modern water heaters give perfect combustion even if the air supplied to them contains as much as 4% $CO_2$.[3]

(*c*) *As a safeguard against Static Conditions in the Secondary Flue.*

Air movement in the secondary flue may be prevented by a material blockage of the flue caused by a bird's nest, disintegration of the flue material, or " swelling " of the flue due to condensation; or by refuse, building materials, or other solid objects falling into the flue or left there through carelessness in the course of construction. Of course, if reasonable precautions are taken in the termination of the flue and the design and material used in its construction, the likelihood of blockage of this nature is very remote. If the flue shown in fig. 2A were blocked in this manner very bad combustion, or more probably complete extinction of the flames of the appliance, would occur. With the appliance fitted as shown in fig. 2B the products of combustion would be discharged through the baffler relief outlet into the room. The effects of this would be similar to those already described, but a serious degree of atmospheric vitiation could more easily arise, as little or no dilution of the products of combustion would be taking place before their entry into the room. Statistically, however, it is again evident that the risks are negligible.

Static conditions could also arise momentarily if at any time the small potential pressure promoting ventilation were exactly offset by an air pressure due to outside wind

* Apart, of course, from mechanical draught, with which we are not concerned in this Paper.

or temperature conditions.* This pressure by itself would, if the appliance were not alight, cause downdraught. It is unreasonable to expect that the exactly balanced condition could persist for any appreciable period, as both the pressures are likely to fluctuate—the former because the arrest of the flow of products would cause the temperature of the gases in the secondary flue to change, the latter because of the usually variable nature of the winds causing the downdraught pressure. Fig. 3 shows two typical wind pressure curves obtained at Watson House some years ago. Analysis of a larger number of records taken over a period of several weeks shows the curve (A) to be a far commoner type.

We would, at this stage, draw attention to the ingenious devices (B.P. Nos. 384,200 and 452,315) in which a bimetal strip and a thermo-electric element respectively are used to cut off the gas supply to the burner of the appliance in the event of downblow or static conditions occurring. In our opinion these are refinements which have been proved in practice to be unnecessary in normal installations, but may prove useful for high gas rate appliances required to be fitted into exceptionally small or ill-ventilated rooms or enclosures. In normal installations they would merely be a nuisance. The logical development of this principle would be to control the gas supply by a device sensitive to dangerous carbon monoxide concentrations. Such precautions are, of course, employed in large-scale plant, but in their present form are far too expensive

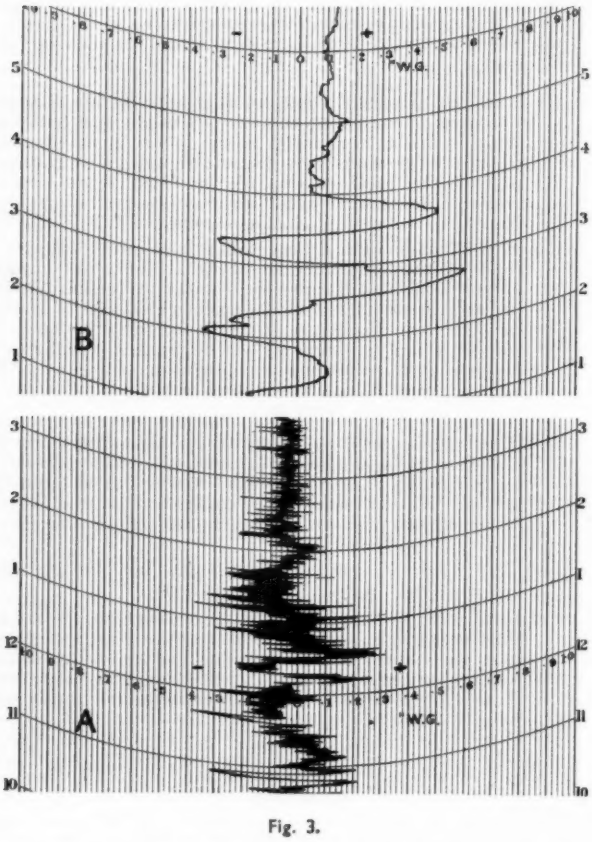



Fig. 3.

and complicated to be supplied as parts of domestic appliances. In theory, closed-circuit balanced flue appliances are perhaps the ideal solution, but in practice there is some doubt as to their absolute reliability, while there are other objections on grounds of cost, difficulties of maintenance, &c., of some at least of those so far proposed.

To sum up then, we can say that permanent static conditions, although highly undesirable, are, if reasonable precautions are taken, unlikely. In any case, *even if they do arise, there is no doubt that it is better to have a baffler fitted than to have no baffler.*

### (d) *To isolate the Appliance from the Effects of Excessive Updraughts.*

Referring again to fig. 2A and assuming that the gas rate of the appliance is fixed, it will readily be understood that the combustion conditions in the appliance connected directly to the outside air by an unbroken flue will vary according to the length of the flue. In still-air conditions the taller the flue the more air will be drawn in at the base of the appliance. Although at first this may appear beneficial as tending to improve combustion, in fact it is usually undesirable for the following reasons:

(i) The working efficiency of the appliance will normally be reduced. In a geyser, for example, the optimum results for thermal efficiency are usually obtained with no flue. In a gas fire there may be an appreciable drop in efficiency if the draught is too great, due to cooling of the radiants by the inrush of cold air.

(ii) Although more air is being drawn in, the combustion may be impaired by flame lengthening, shooting, or chilling, caused by the extra air being drawn across the burners.

The installation with baffler (fig. 2B) is free of these troubles. The quantity of air drawn in at the base of the appliance is virtually unaffected by the length of secondary flue, as the additional air is now drawn in at the hood of the baffler. This extra air will usually have a beneficial effect in reducing or preventing possible condensation.

Excessive updraught in the secondary flue need not necessarily be a result of the natural ventilating effect of a long length of vertical flue. Even with very short flues a strong updraught may be induced by external wind effects, caused either by the fact that the flue terminates in a region of reduced pressure on the leeward side of an obstruction or that the terminal takes good advantage of any wind movement in inducing ventilation.[17-31]

## III. WHAT SHOULD A PERFECT BAFFLER DO?

We are bound to conclude that an appliance should be designed for a definite gas rate and thermal output, and that the baffler should (and as we shall see, can) ensure that the latter is maintained very nearly constant, whatever the secondary flue or wind conditions may be, provided the gas rate is suitably controlled. If the last-mentioned condition is fulfilled (we are assuming the gas composition remains constant) the simplest criterion of the combustion performance and of the ventilation induced in the appliance is the percentage of carbon dioxide present in the flue gases. This, in conjunction with the knowledge of the composition of the gas, indicates how much excess air is being drawn into the combustion chamber per cubic foot of gas burned,* the higher the $CO_2$ percentage the less the amount of air being drawn through the appliance, and *vice versa.*

If the $CO_2$ percentage in an appliance with no baffler fitted is N%, the addition of a "perfect" baffler would cause no change in the value of N—*i.e.*, the primary resistance† of a perfect baffler would be zero. Unfortunately, the resistance of a baffler is a function of the velocity, density, and viscosity of the gases passing through as well as of the design of the baffler. Hence it is not permissible to assume that a baffler of zero resistance on one appliance will have no resistance when fitted to another. There is experimental evidence‡ confirming this theoretical conclusion, and we are in fact led to the opinion there is no such thing as a "good baffler" *per se* and that a rigid specification for baffler performance *must* take into account the particular appliance to which the baffler is to be attached. In practice this means that the "general purposes baffler" should no longer be used. *Each appliance should be definitely associated with a particular baffler, either as an integral part or listed as an essential fitting not to be replaced by something else "just as good," any necessary primary flue being incorporated in the appliance and/or baffler.*

It will be clear that for practical purposes it is not essential to use a baffler "perfect" in respect of primary resistance, since the appliance with its baffler can and should be made to pass the standard tests for combustion. Normally, however, it is good practice to make the primary resistance even of integral bafflers as low as possible, letting the flueways of the appliances themselves control the flow of hot gases, a condition favourable to good heat transfer.[7]

Similarly its secondary resistance should be zero—*i.e.*, it should be able to "clear products" or prevent any leakage of the products of combustion beneath the hood without the addition of any secondary fluepipe. Its ability to

* A cold chimney with hot outside air can give a reversed chimney effect; the condition is more commonly met in tall brick flues such as boiler flues than in short metal flues, for obvious reasons. For example according to H. B. Price,[14] M. K. Drewey reports that he has observed negative chimney draughts of this type at least 25 times during two summers.

* Absence of carbon monoxide is, of course, assumed in this reasoning, but must be assured during the testing of the baffler.

† We have used the terms "primary resistance" and "secondary resistance" somewhat loosely in this Paper, in the sense indicated by the context here and below.

‡ *Cf.* Section VI.

do so is clearly related to the volume of products, with which it has to deal—*i.e.*, to the appliance to which the baffler is to be fitted.* Hence we again conclude that a given appliance should be associated with a definite baffler.

Finally, the application of updraught or downdraught over a wide velocity range (*e.g.*, by means of a blower or other suitable apparatus), or of static conditions (realized experimentally by capping the secondary flue), should lead to no change in value of N. The performance of a perfect baffler for any given appliance can thus be represented graphically by fig. 4.

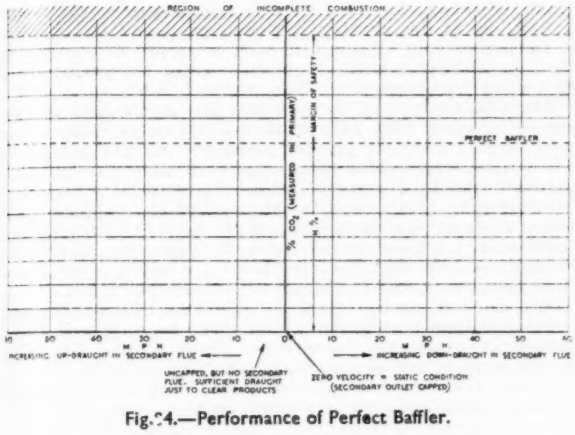

REGION OF INCOMPLETE COMBUSTION
MARGIN OF SAFETY
PERFECT BAFFLER
% $CO_2$ (MEASURED IN PRIMARY)
M.P.H.
INCREASING UP-DRAUGHT IN SECONDARY FLUE
INCREASING DOWN-DRAUGHT IN SECONDARY FLUE
UNCAPPED, BUT NO SECONDARY FLUE. SUFFICIENT DRAUGHT JUST TO CLEAR PRODUCTS
ZERO VELOCITY = STATIC CONDITION (SECONDARY OUTLET CAPPED)

Fig. 4.—Performance of Perfect Baffler.

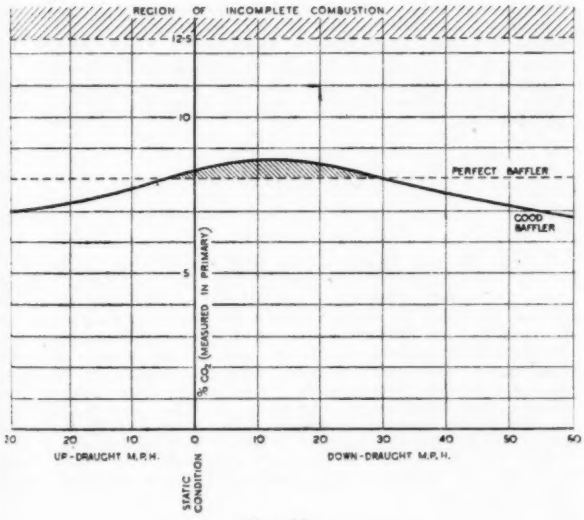



Fig. 4A.

It is found in practice* that the actual shape of curve obtained depends on the appliance to which the baffler is fitted, and once more we conclude that each appliance should be associated with a specified baffler.

## IV. HOW NEARLY DO EXISTING BAFFLERS APPROACH PERFECTION?

### (*a*) *In their Primary Resistance.*

In practice it is usually found that the addition of a well designed baffler causes a slight increase in the $CO_2$ content of the primary flue gases. (There are exceptions: the addition of a baffler embodying in itself a fair length of primary flue, especially if the appliance to which it is fitted is comparatively short in relation to its cross sectional area, may actually reduce the $CO_2$ content. It is also conceivable that a given baffler should increase the $CO_2$ content on one appliance yet reduce it in another. From these facts alone it should be evident that a rigid specification for baffler performance is impossible without reference to a specified appliance.)† To give one example, the $CO_2$ percentage in a certain geyser without its baffler is 7·2; with the baffler fitted the $CO_2$ content rises to 7·6. In both conditions the heater at its nominal rating passes standard combustion tests, though with a smaller but adequate margin in the second case. An increase of up to 0·5% in the $CO_2$ is in these circumstances regarded as tolerable. The important point, as we have already stated, is that the appliance together with its baffler should pass standard combustion requirements.[4, 7] The figures quoted are merely intended to indicate how closely a reasonably well designed baffler approaches perfection in its primary resistance.

### (*b*) *In their Ability to lead away the Products of Combustion: Secondary Resistance.*

There are examples of bafflers which when fitted to the particular appliances for which they were designed are capable of carrying away all the products of combustion without the addition of any secondary flue. This represents an ideal state of affairs to be aimed at so far as it is consistent with other requirements, but we consider a baffler tolerable if it will clear the products of combustion from its appliance when fitted with not more than 2 ft. of secondary flue of the same nominal diameter. The majority of the bafflers we have examined conform to this requirement, but there are some which are definitely unsatisfactory. The usual reasons for the failure of a baffler to clear products with the aid of a reasonable length of secondary flue are:

(i.) Inadequate diameter of secondary flue connection.

(ii.) More commonly, insufficient clearance between the hood and the deflecting plate.

(iii.) Unfavourable shape of hood—*e.g.*, sudden changes of direction, pockets, &c.

The second reason accounts for the necessity for an adequate size of hood. By making the hood large enough it will always be possible to arrange for the baffler to clear products without any extra secondary flue, provided of course that the secondary outlet is of sufficient size, but it is not always desirable to add a very large baffler to an appliance, a satisfactory compromise being usually effected by designing the baffler so that it will "clear" with about one foot of secondary flue. Every effort should, however, be made to keep the secondary flue required to effect clearance as short as possible.

The effect of crossdraughts on the clearance of products must also be considered; such evidence as we have suggests that bafflers with hoods which reach down to or below the level of the break in the primary flue—*i.e.*, the majority of the bafflers we have tested—are satisfactory in this respect.

### (*c*) *In their Ability to cope with Adverse Draught Conditions.*

We have already stated that the $CO_2$ curve obtained with the perfect baffler at various downdraughts, static conditions, and updraughts, should be a straight line parallel to the velocity axis. As might be expected, no baffler that we have examined gives exactly this result. Those we have tested can be roughly divided into three main groups—the very bad, the bad, and the good bafflers.

Those we have classed as "very bad" when subjected to downblow, by reason of some major fault in design (usually restricted relief outlet, as in the so-called "cage" baffler) cause the flames in the appliance to which they are fitted to smother completely at high and low velocities alike. Fortunately, such bafflers are now rarely encountered, and we hope that the information available in this Paper and elsewhere will lead to the rapid and complete elimination of the type. We give no $CO_2$-velocity curve for such a baffler, since clearly it is unnecessary.

In this country, until recent years, the most-used method of testing bafflers was by visual examination of the effect of downblow on the appearance of the flames at the burner. If the flames obviously smothered or were extinguished by the downblow the baffler was rejected as bad, if not it was accepted as good. There were various reasons for supposing that this method was inadequate, and we therefore made experiments in which the variation of $CO_2$ content of the primary flue gases with velocity of up or down draught was studied. Similar experiments have independently been done in Germany, though so far as we are aware only a few results have been published. Our own experiments have been done on a large number of bafflers of widely differing patterns, and the refinements introduced into the method of test have disclosed the other class of baffler which we have described above as merely "bad." In this type the divergence from the perfect straight line $CO_2$ curve is so great that the $CO_2$ percentage at certain downblow velocities reaches a value almost high enough to result in bad combustion, but not sufficiently high to have any very obvious effect on the appearance of the flames or smell of the products. A typical curve of this

* *Cf.* Section VI.

† *Cf.* Sections III. and VI.

class of baffler is shown in fig. 5. It should be noted that there is a peak $CO_2$ value occurring at comparatively low wind velocities (usually at about 10 ft. per second). For this reason *it is extremely important when testing a baffler to observe the effect of low downblow velocities very carefully.* Perfectly satisfactory results may be obtained with a downblow of 80-90 ft. per second, but the baffler may be quite dangerous with a downblow of 10 ft. per second or

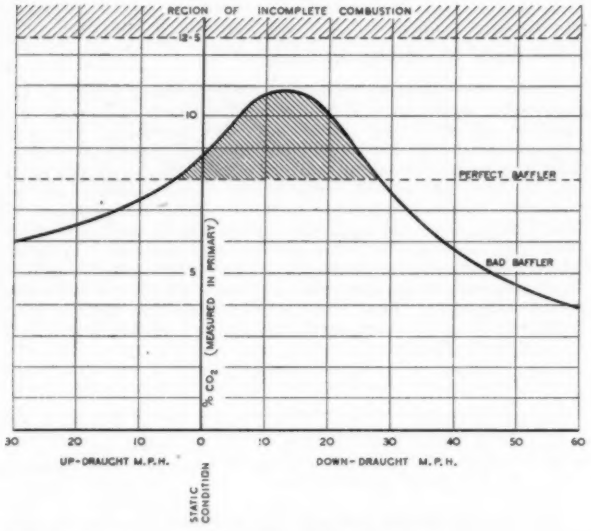



Fig. 5.—Performance of Bad Baffler.

less. The objection to this type of baffler—that if it is subjected to downdraughts of velocities in the region of that which leads to the peak $CO_2$ value, the safety margin of combustion allowed for other reasons given may be completely neutralized—will be clear from fig. 5.

Lastly we have the good bafflers, nowadays preponderating, which give typical $CO_2$-velocity curves similar to those of the bad bafflers in form but differing quantitatively. At low downblow velocities there is as before a rise in $CO_2$, but this is slight in comparison with that found with bad bafflers. At higher downblow velocities and under conditions of updraught there is a slight reduction in the $CO_2$ percentage—*i.e.*, a slight increase in the amount of air being drawn through the appliance.

Our experiments thus indicate that all the $CO_2$-velocity curves are of similar form, except where disturbing factors such as incomplete combustion, sudden change of gas quality, or induced pressure or suction effects in the air around the base of an appliance* have to be taken into account; any departure from the general form of curve leads us to look for some such irregularity.

The line of demarcation between good and bad bafflers is thus somewhat vague, but after a survey of our results we suggest that suitable requirements for the performance of a good contemporary baffler are as follows:

*The $CO_2$ content of the primary flue gases shall not* increase *by more than* 10% *of its normal value in an appliance having* 100% *or greater pressure overload margin or* 5% *of its normal value in an appliance having only a* 50% *pressure overload margin, when the secondary outlet is blocked* (i.e., *static conditions*) *or when the baffler is subjected to downblow up to* 60 *miles per hour or updraught up to* 30 *miles per hour, nor* decrease *by more than* 20% *of its normal value in any appliance when the baffler is subjected to downblow or updraught up to* 20 *miles per hour.*

We do not wish to enter into a discussion of why precisely these standards, which must be admitted to be somewhat arbitrary, have been chosen, since to do so would require more time than we have at our disposal, but lest the figure of 60 miles per hour should appear unreasonably high we mention that in our experience there is no serious difficulty in designing a baffler capable of dealing with a wind of this velocity, although, as we have indicated, lower velocities may be more troublesome. There are available many bafflers passing these tests when fitted on the appropriate appliances; those which fail should not, in our opinion, be regarded as satisfactory for present-day use, even though they may compare favourably with bafflers looked upon as adequate up to a year or two ago.

* *Cf.* Section VI.

(*To be continued.*)

## Athletic and Social

### Jersey Children's Treat.

The 31st annual children's treat and entertainment of the Jersey Gas Light Company was held on Saturday, Jan. 16, when 180 children of the employees were entertained in the afternoon and evening.

Assembling early they enjoyed a coach trip before being taken to the Forum Theatre for the matinée performance of "Goody Two Shoes." After another short coach trip they proceeded to the Plaza, where they were welcomed by Mr. Harry Morris, Managing Director of the Company. Following tea and the usual festivities, Mr. Morris presented to each child a handsome gift from the huge Christmas tree in the ballroom.

### Rotherhithe Co-Partnership Institute: Annual Dinner and Concert.

Unanimously voted a thoroughly successful evening, the twelfth Annual Dinner and Concert of the Rotherhithe Co-partnership Institute of the South Metropolitan Gas Company was held at the New Inn Restaurant, Westminster Bridge Road, London, on Saturday, Jan. 23. The chair was taken by the Engineer of the Rotherhithe Station, Mr. T. A. Canning, and among those present were His Worship the Mayor of Bermondsey, Councillor E. J. Gibson, J.P., Councillors C. E. Philpot, J.P. (last year's Mayor of Bermondsey) and J. Lynch, J.P., and Mr. F. G. Brewer, Secretary, South Metropolitan Gas Company.

The Loyal Toast having been honoured on the call of the Chairman, Mr. A. Lee, Chairman of the Co-partnership Committee, proposed "Co-partnership." The scheme of the South Metropolitan Gas Company, he observed during the course of his remarks, was still ahead of any other. The reply was by Mr. J. B. C. Pinks, Employee Director, who, incidentally, recently completed 47 years of Co-partnership. He traced the movement from its inception by Sir George Livesey and pointed to the benefits it conferred on the worker. He was convinced that had co-partnership been universally adopted in this country industrial unrest and discontent would be unknown. Mr. H. Hollis proposed "The Metrogas Amateur Sports Association," and the Chairman of the Metrogas A.S.A., Mr. H. Putt, in response, said theirs was one of the finest sports associations in London and from time to time they received requests as how to run a successful sports association.

"Our Guests" was ably proposed by Mr. F. G. Brewer, who said that it was a great honour and privilege to have the Mayor and Councillors Philpot and Lynch with them that evening. He was happy to say that the relations between the South Metropolitan Gas Company and the Council had always been extremely friendly. The Mayor responded in happy terms; referring to co-partnership he observed that when employees took an interest in their firm they could not go wrong; neither could the firm. In proposing the toast of "The Chairman," which was accorded musical honours, Mr. W. Quinn paid a generous tribute to Mr. Canning's qualities both as their Chief and as their friend. In reply, the Chairman thanked Mr. Quinn for the manner in which he had proposed the toast and those present for the manner in which they had received it.

The speeches were interspersed with items by Steve Cairns and Mabel Wilman, who presented their "Band Box" entertainment.

### Swindon's Annual Dinner and Social.

Continued progress during the past year was mentioned at the Annual Dinner and Social organized by the staff of the Swindon United Gas Company at the Goddard Arms Hotel, on Jan. 20.

Mr. Cecil H. Chester (Director and General Manager) presided, supported by the Chairman of the Company (Major F. G. Wright) and other Directors.

Following the loyal toasts, Mr. W. B. Claridge (Assistant to Mr. C. H. Chester) submitted the toast of "The Directors and the Company." He said that during the past year there had been marked expansion in the work of the Company in the district. The adjacent towns of Faringdon and Highworth had been coupled up with Swindon, and this meant the laying of 12 miles of steel mains, which had been completed in six months. The output of appliances had reached a record, a house-to-house canvass showing that 18,401 domestic and industrial appliances had been issued. This number included 10,732 cookers.

Major F. G. Wright briefly responded to the toast, and spoke of the great progress made during the past 20 years.

Mr. T. Medcalf (Director) proposed the toast of "The Staff," and Mr. W. J. Kight (Works Manager) responded.

### Messrs. Walworth: Sales Convention.

The Annual Sales Convention and Dinner of Messrs. Walworth, Ltd., at which Mr. V. L. Young, Managing Director, took the Chair, was held on Friday, Jan. 8, at Bridge House. Walworth salesmen, representatives, and departmental chiefs from the London head office were fully represented.

One outstanding feature of the gathering was the number of members who have been associated with the Company for so many years—one for 45 years, one for 43 years, and several others of over 40 years' service. The dinner was followed by a visit to the Saville Theatre.

# THE AUSTRALIAN GAS INSTITUTE

*From a Paper presented at the Ninth Annual Convention of the Institute held at Adelaide from Nov. 24 to Nov. 26, 1936.*

# Dry Gas

by

**C. F. BROADHEAD, Melbourne**

The term "dry" gas used in its present connection indicates that approximately 60% of the moisture present in the gas is removed, or an amount sufficient to prevent any deposition in the distributing system.

At West Melbourne Works a Holmes "Dri-Gas" plant was placed in commission in November, 1933, and has operated continuously since that date. The climatic conditions prevailing in Australia have necessitated slight modifications in size of plant and procedure. The lower the temperature the more efficient is the calcium chloride process; thus it has been found advisable to install a plant of a capacity somewhat in excess of the requirements under English conditions. The plant purchased was capable of dehydrating 18 million cu.ft. of gas per day in England, but the efficient daily throughput under Melbourne summer conditions is about 15 million cu.ft.

One of the essentials for satisfactory operation of this plant is to maintain a very low ammonia content on the inlet gas, preferably under 0·2 grain per 100 cu.ft. This is almost an impossibility in the Australian climate, with the water temperature in summer exceeding 70° F. The ammonia in the form of ammonium hydroxide reacts with the calcium chloride, forming calcium hydroxide and ammonium chloride. The carbon dioxide further reacts with the calcium hydroxide forming calcium carbonate, which is carried in suspension in the circulating liquid, and if allowed to accumulate tends to block the cooling coils. To obviate any excess concentration of ammonium chloride, a small addition has been made to the plant. Five hundred gallons of the solution per day is drawn from circulation and treated with the requisite quantity of lime; this liberates the ammonia, which is collected, and the chlorine again being converted to calcium chloride. The solution is allowed to cool, and is pumped back into circulation.

The formation of a small quantity of calcium carbonate in suspension has, however, one decided advantage; it removes a large percentage of the hydrocyanic acid from the gas. During the three years prior to the installation of this plant, the hydrocyanic acid content of the city gas was 21 grains per 100 cu.ft., but in the three years following the installation this has been reduced to 5 grains per 100 cu.ft. Some criticism has been forthcoming concerning the maintenance of "Dri-Gas" plants due to the corrosive influences of calcium chloride solution, but our experience has been that this criticism is unwarranted, as so far there have not been any replacements in the plant. No labour for operation is required, a portion of one man's time each day is devoted to keeping the plant clean, and the cooling water tubes are regularly washed out at intervals of once a week.

Strict technical control is maintained, the strength of the solution, stock, temperatures, and rate of flow are checked and recorded twelve times each day (24 hours), and the dew point of the gas and efficiency of plant determined five times each 24 hours. No trouble whatever has been experienced in plant operation or in the solution being carried forward in the gas from the washers. At the South Melbourne Works a gas-drying plant of somewhat novel design has been put into operation. About 25 years ago, Mr. P. C. Holmes Hunt, in order to improve the extraction of ammonia by chilling the water for use in the washers, installed at South Melbourne a steam engine driven refrigerating plant equal to 12 tons refrigeration per 24 hours, and capable of cooling 600 gallons of water per hour from 80° F. to 45° F. This plant operated effectively for several years, and was particularly valuable during the summer.

When about to re-open the South Melbourne Works, it was decided to utilize this plant to supply extremely cold water to scrub the water vapour out of the gas after the gas had left the purifiers. Accordingly, a grid packed scrubber tower was erected and sheathed with a 2-in. thickness of "Treetex" insulating wall board. The cold water from the refrigerator trickles down the grids in this tower, where it cools the gas passing upward through it, and condenses out the superfluous moisture. The water from the scrubbing tower is pumped back to the cooling tank of the refrigerator, and passing over the cold submerged ammonia coils is re-cooled, and re-circulated. This water is continuously increasing in bulk owing to the continual addition of the condensate; the excess is allowed to flow off from the top of the cooling tank into a separator of capacity of twelve hours' flow, where the condensed oily matter floats to the surface and is drawn off.

The cooling tower was designed for a capacity of 3 million cu.ft. per day; at the present time it is handling 2¾ million cu.ft. per diem. During the year ended June 30, 1936, the average daily make at West Melbourne Works was 11,660,000 cu.ft. and at South Melbourne 950,000 cu.ft. During this time the operating costs of the two plants were:

| — | West Melbourne. | South Melbourne. |
|---|---|---|
| | £ s. d. | £ s. d. |
| Repairs, maintenance, and stores | 908 1 0 | 217 18 2 |
| Wages | 102 17 8 | 50 0 0 |
| Steam | 1,281 0 0 | 166 8 0 |
| | £2,291 18 8 | £434 6 2 |
| Cost per 100 cu.ft. | 0·128d. | 0·299d. |

When operating to the full capacity of 3 million cu.ft. per diem, the cost of the South Melbourne process would be considerably less than 0·299d. per 1,000 cu.ft. On a large-scale plant the cost by this process would be correspondingly lower, which appears to make it an attractive proposition.

A comparison of the percentage of moisture extracted from the gas during the past twelve months is as follows:

| — | West Melbourne. | | South Melbourne. | |
|---|---|---|---|---|
| | Calcium Extraction. | Chloride Dew Point. | Intense Extraction. | Cooling Dew Point. |
| | % | °F. | % | °F. |
| January | 62·13 | 54·4 | 70·6 | 44·3 |
| February | 62·90 | 53·7 | 72·2 | 43·3 |
| March | 61·46 | 55·6 | 71·1 | 44·6 |
| April | 52·00 | 51·2 | 67·8 | 40·8 |
| May | 51·20 | 48·6 | 62·2 | 39·4 |
| June | 47·84 | 45·6 | 48·5 | 40·7 |
| July | 47·30 | 44·0 | 46·5 | 40·4 |
| August | 48·30 | 45·2 | 52·7 | 38·8 |
| September | 49·23 | 47·7 | 53·6 | 41·2 |
| October | 51·70 | 51·0 | 60·0 | 39·9 |
| November | 56·50 | 53·4 | 62·6 | 41·3 |
| December | 62·10 | 53·2 | 68·3 | 43·5 |
| Average | 54·39 | 50·3 | 61·3 | 41·5 |

The removal of moisture by means of calcium chloride does not directly influence the content of light oil or gum-forming compounds in the gas. It does, however, influence the position indirectly in two ways.

(*a*) When a moisture-laden gas suffers a reduction in temperature, and moisture deposits, it tends to entrain light oil, thus depositing more gum-forming compounds than the mere reduction in temperature would warrant.

(*b*) Considerable damage is done to meter leather diaphragms by deposition of moisture after the light oil has removed the dressing; these destructive influences are non-existent if the dew point is sufficiently lowered by adequate moisture removal.

In addition to the advantages enumerated in connection with the calcium chloride process, intense cooling has a

direct influence on gum formation in the distribution system.

Besides the removal of water vapour, large quantities of light oil are deposited before the gas leaves the Works. In the plant at South Melbourne, when treating 3 million cu.ft. of gas per day, 1,000 gallons of light oil containing 25% of gum-forming constituents are deposited per month. By this means 12 tons of actual gum-forming compounds are removed from the city gas each year.

This advantage is even greater than one would suppose at first sight. When the gas is subjected to intense cooling, the higher boiling constituents are deposited, and these are richer in gum-forming compounds, so if any gum-forming constituents still remain in the city gas they are rendered practically innocuous by the presence of benzole and toluol, which tend to maintain them in a state of solution. The oil condensed out has a value of 8d. per gallon. Furthermore, the organic sulphur compounds in the gas are reduced by 25%, and all the ammonia absorbed so that not a trace passes forward.

During the twelve months under review, the average quantity of organic sulphur compounds remaining in the gas was 13·52 grains per 100 cu.ft. at West Melbourne and 9·48 grains at South Melbourne. These figures indicate the efficacy of the extraction by extreme cooling. Prior to the use of the intense cooling plant at South Melbourne, the naphthalene content of the gas amounted to 10 to 12 grains per 100 cu.ft., but now there is scarcely a trace of it. The reduction in calorific value caused by oil deposition is almost exactly balanced by an increase due to the reduction in volume of the gas by moisture removal. To ensure that the gas is delivered in a dry state to the mains, the wet station meters at West Melbourne have been replaced by the Connersville type, and at South Melbourne by a Kent meter, and the gasholders are oil filmed.

## Effect on Distribution.

Following the installation of the Holmes plant at West Melbourne, the value of dehydration on the distribution system was immediately reflected by the diminution in "water in service" complaints. For the year 1934, complaints under this heading decreased by 20%, for 1935 by 46%, and for the three quarters of the present year by 28%. Service corrosion troubles, however, were slower in responding. In fact, in 1934 these complaints increased to the extent of 3½%. This was to be expected, since the oxide in its dry condition was carried along the mains by the gas at a greater rate than hitherto, and deposited in the services. It was not until the following year, 1935, that we began to feel the benefit of dry gas so far as corrosion was concerned. In that year our complaints decreased by 19%. This improvement has been further maintained during the current year; the decrease for the three quarters ended Sept. 30 amounting to 7¾%.

Owing to the distributing system in Melbourne being approximately double the length of a corresponding system in England, a greater time must elapse before the full benefits of dehydration are felt.

The following table gives an analysis of the complaints dealt with for the years 1930, 1933, and 1935:

| Nature of Complaint. (To Meter Outlet.) | Year 1930. | Year 1933. | Year 1935. |
|---|---|---|---|
| Corrosion in service | 17,199 | 14,329 | 11,980 |
| Water in service | 12,939 | 14,980 | 6,433 |
| Escapes | 9,031 | 8,030 | 8,162 |
| Defective meters | 9,930 | 8,550 | 7,489 |
| Taps eased | 2,276 | 2,128 | 1,736 |
| Sundry | 994 | 956 | 744 |
| | 52,369 | 48,973 | 36,544 |
| Complaints per consumer | 0·279 | 0·264 | 0·190 |
| Average period in years between complaints by each consumer. | 3½ | 3¾ | 5¼ |

In 1930 complaints reached a maximum figure, attributable mainly to the use of English coal with a high sulphur content imported as the result of the miners' strike at Maitland, New South Wales. The 1933 figures are a fair average of complaints, using Australian coal, prior to dehydration, while those for 1935 were with dehydrated gas.

## Effect on Dry Meter Maintenance.

On arrival in this country twenty-four years ago, the writer was strongly advised on no account to consider the adoption of dry consumers' meters, mainly, it was held, on account of climatic disadvantages. This advice went unquestioned until about ten years ago, when experience with dry meters in Melbourne convinced him that the shortcomings of the dry meter were due in a great measure to the composition of the gas and little to the peculiarities of the climate. Since 1925, the oxygen content of the gas has been reduced to a reasonable figure—a little over 1%—and the ammonia content to 0·27 of a grain per 100 cu.ft. A gas of this composition, in conjunction with a 50% reduction in the moisture content, has little or no detrimental effect on dry meters.

Under these improved circumstances, together with the greater care exercised in the choice of materials, and in construction, dry meters have a distinct advantage over wet meters. With the advent of dry gas it is obvious that no other type of meter need be considered in Australia. This is borne out by our experience. Defective meters changed during 1934 totalled 8,957, or 4·76% of the total meters in use. In 1935 the number was reduced to 7,489—a decrease of 16·38%—or 3·90% of the total meters, and up to Sept. 30 of the present year we changed 4,972 meters—a decrease of 14·32% on the corresponding three quarters of 1935—or 2·53% of the total meters in use.

The primary effect of the dehydration of gas as it affects meters has been the almost total absence of moisture deposited in, and on the moving parts of, our meters since this practice was adopted. Consequently we are not now faced with repairing damage directly due to the presence of moisture, the harmful effects of which may be summarized as follows:

1. *Effect on Meter Diaphragms.*—Leather which has been deprived of the dressing by light oils deposited from the gas is rendered vulnerable to attack by water, which rots the leather and causes it to leak, thus making the meter run very slowly, or not register gas at all.

Though it is not considered that the whole of the decrease in the number of meters returned for slow and not registering is due to absence of water, there is no doubt that it has been a factor of importance.

2. *Effect on Stuffing Boxes.*—Water has an effect on the wool material used in stuffing boxes, causing it to become hard and lose its elasticity with consequent leakage of gas through the box.

3. *Effect on Wear of Brass Parts.*—Nearly all our meters are of the back plate type in which the cranks are made of brass, which is an alloy of copper and tin.

It used to be a common thing to find, when a meter came in for repair, that the crank was badly worn where it passed through the stuffing box, and where it was in contact with the valve arms. Deposits which were discovered to be sulphates were also found at these places.

The wear between crank and valve arms had the effect of upsetting the correct timing of the valve openings, thus causing the meter to run slow.

The corrosion was due partly to electrolytic action taking place in the presence of moisture, and partly to sulphur compounds from the gas acting in solution in the deposited water. This trouble, now that the gas passing through the meters is dry, is seldom encountered.

In the new open-top type of meter which is being adopted with the object of increasing meter capacities, other moving parts in addition to the cranks and valve arms come under the influence of the gas, the most important of which are the worm on the crank and the pinion in the index spindle which is driven by the worm. The meter makers who introduced the open-top meter found that these parts suffered a good deal from wear and corrosion, and most makers now enclose them in a grease-filled box for protection. It has not been necessary for us to do this, as we found that with dry gas there is no corrosion on any part of the meter. It is anticipated that our meter complaints will further decrease even with the adoption of the open-top type of meter.

4. *Corrosion of Tin Plate.*—Usually the tin plate part of the meter which suffers most from corrosion is the valve plate. When light or inferior tin plate is used this may be a serious matter, as it is not possible to put a new valve plate in the meter when it is rusted through. Owing to the use of first quality tin plate in our meters this complaint, never a very troublesome one to us, is now, with dry gas, practically non-existent.

The cost of the "Dri-Gas" plant totalled £19,789—equivalent to £1,100 per million cu.ft. per diem. The running costs for the year ended June, 1936, were £2,726, and taking interest and depreciation at 11%, the capital charges were £2,177—a total of £4,903 per annum, approximately ¼d. per 1,000 cu.ft. of gas sold. The savings in the Distribution Department, it is estimated, will exceed this amount. But quite apart from any saving, the benefit derived by the consumer and the company by the reduction in complaints is well worth the cost of the process.

In the writer's opinion the supply of dry gas is the greatest advance in the Industry since the introduction of the vertical retort.

# Review of the General Meeting of the Union Syndicale de l'Industrie Technique du Gaz en France

(*Continued from p.* 158.)

## A New Compressed Gas Station

The station for the supply of compressed gas for automobile use opened at the Vannes Gas-Works at the end of 1935, formed the subject of a Paper by L. de Meneval.

The pressure to which the gas is compressed is 3,500 lb. per sq.in. and the storage reservoirs have, at this pressure, a sufficient reserve to enable the gas cylinders of a lorry to be filled to their working pressure of 2,850 lb. per sq.in. with a sufficient speed—namely, in 8 minutes.

The compressor, which has a capacity of 7,000 cu.ft. of free gas per hour, is a four-stage, 78 h.p. Burckhardt machine of the twin shaft type. Interstage cooling and forced lubrication are provided. The compressor is driven, with the intermediary of reducing gear, by a 125 h.p. asynchronous motor cooled by means of air supplied by a motor-driven fan. The air, which is drawn in from the outside of the compressor house, serves for the ventilation of the latter after having performed its function of cooling the compressor motor and leaves by way of a large lantern light. The adoption of such a system enables the compressor and its motor to be housed in a single building without a separating wall. Adequate automatic safety devices have been installed. The two storage reservoirs, each having a water capacity of 40 cu.ft., are cylindrical in form and are reinforced with metal straps.

A simple, though not rigorously scientific, method of charging for the gas supplied to vehicles is in force. The water capacity of the cylinders multiplied by the difference between the initial and final pressures is taken as being equal to the volume of gas supplied—*i.e.*, no allowance is made for the substantial deviation of coal gas from the gas laws. Since reservoirs are in use and the gas is not supplied direct from the compressor to the cylinders, it is assumed that the heat developed by the passage of the gas into the cylinders is balanced by the cooling effect which the gas suffers on being released from the reservoirs.

Prior to the installation of the plant, a canvass was made with a view to the establishment of the potential demand for compressed gas. The anticipated consumption has been realized and seems likely to develop further. The gas is sold at a price showing a saving of 50% in comparison with petrol and comparable with running costs on fuel oil. The Author concluded with a plea for the establishment of a chain of compressed gas stations in France.

## Adaptation of Solid Fuel Fired Central Heating Plant to Gaseous Firing

According to L. Fourrier, consumers of solid fuel in central heating appliances could be attracted to the use of gas by one of two proposals—namely, either that the boiler should be replaced by one specially designed for burning gas or that the existing boiler should be adapted to the use of gas. The Author demonstrates, on the basis of work carried out at Gennevilliers on an Ideal "Classic" No. 2 boiler, that the second solution is technically and commercially feasible. The boiler in question was adapted to gaseous firing by suitable modifications after elimination of all those components specifically concerned in the processes of handling and burning solid fuel.

A special fire-box plate was substituted for the existing plate and was provided with (1) air ports, (2) a mica window through which the burner flame could be inspected, (3) a small bracket for the attachment of the burner, and (4) a small opening for the pilot flame. An inspection cover was substituted for the cover of the coke charging-hole. The burner was formed from brass tubing bent into the form of a rectangle and provided with twenty No. 2 Bray jets distributed over the sides and back of the rectangle. Inside the rectangular space within the burner was fitted a hollow radiation block having the shape of the frustum of a pyramid and made of heat resisting metal. A rectangular baffle of heat resisting metal in the form of a lidless box was snugly fitted half-way up the boiler, its object being to force the combustion products to lick the water tubes.

A suitable interlocking coupling between the main burner and the pilot burner was provided. By means of a governor the gas pressure was cut down to 1½ in. w.g., the burner having been so designed that the requisite gas consumption was obtained at this pressure.

The temperature of the water is regulated by means of a thermostatic device comprising a valve controlled by the thermostatic element supplied with the boiler. The valve has a conical seat and is operated by a guided rod passing through a stuffing-box, the friction caused by the latter being compensated by a counterweight to which is screwed a bracket enabling connection to be made between a rack system and the valve by means of a steel wire, the length of which is fixed approximately during installation, fine adjustment being made by means of the above mentioned threaded rod with the help of a lock nut. The maximum temperature of the outlet water is set by an appropriate adjustment to the air clapper of the boiler.

The vent pipe, 13 in. long, has a diameter equal to that of the outlet flue of the boiler and is integral with a baffler cone carrying a supporting collar enabling connection to be made to a chimney. Finally, a static aspirator is provided to afford protection against down draught. The whole vent system is of aluminium. Inside the base of the baffler cone is a condensate trough; the water collected in the latter is sent, by way of an aluminium tube, to the interior of the boiler, where it becomes evaporated. The cost of the alterations was approximately £5.

The performance of the converted boiler was examined in the Gennevilliers testing station. The rated useful output of the original boiler was 33,500 B.Th.U. per hour. On the basis of the percentage of the heat of combustion of the fuel transferred to the water and on the basis of a temperature of 150° F. for the circulating water, the efficiency on solid fuel was approximately 65% at all throughputs. The efficiency of the modified boiler with gaseous firing was 77·6% at full throughput, 76·8% at two-thirds of full throughput, and 61·6% at one-third of full throughput. The $CO/CO_2$ ratio was 0·007 and was very much lower than with solid fuel firing. Gaseous firing offers advantages in that the operation of the boiler can be clock controlled and that remote thermostatic control from an appropriate location in a habitation can be employed.

## Tests on Gas Cylinders

The results of an investigation of the bursting phenomena of gas cylinders were reported by A. Pignot with special reference to light-weight cylinders reinforced with peripheral and longitudinal wrappings of high-tensile wire. These wrappings enable the wall thickness and, therefore, the weight, also, of the cylinders to be reduced and, at the same time, the bursting pressure is increased. The theory underlying the design of reinforced cylinders was explained.

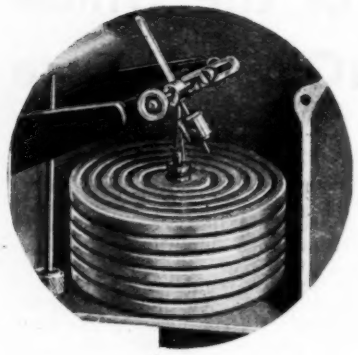
## A Large Gas Kitchen

The lunatic asylum near Vannes, housing staff and inmates to the number of 2,000, was recently equipped with new kitchens. Gas is used exclusively for cooking, for heating the kitchens, and for the supply of all the hot water required for washing crockery and other purposes. The installation was described by J. Tracol.

Gas, at a pressure of 140 lb. per sq.in., is supplied from the Vannes gas-works, 4 miles away, through a 2½ in. main to a cylindrical holder of 2,800 cu.ft. water capacity situated in the asylum grounds. In the basement of the kitchens the gas is governed down in two stages, first to 20 in. w.g. and finally to 3 in., under which condition it is metered.

The daily gas consumption in March, 1936, when 1,480 individuals were fed, was upwards of 12,500 cu.ft., of which approximately 7,000 cu.ft. represent the cooking load and 5,500 cu.ft. the volume used for the central heating plant and the hot water supply.

(*To be continued.*)



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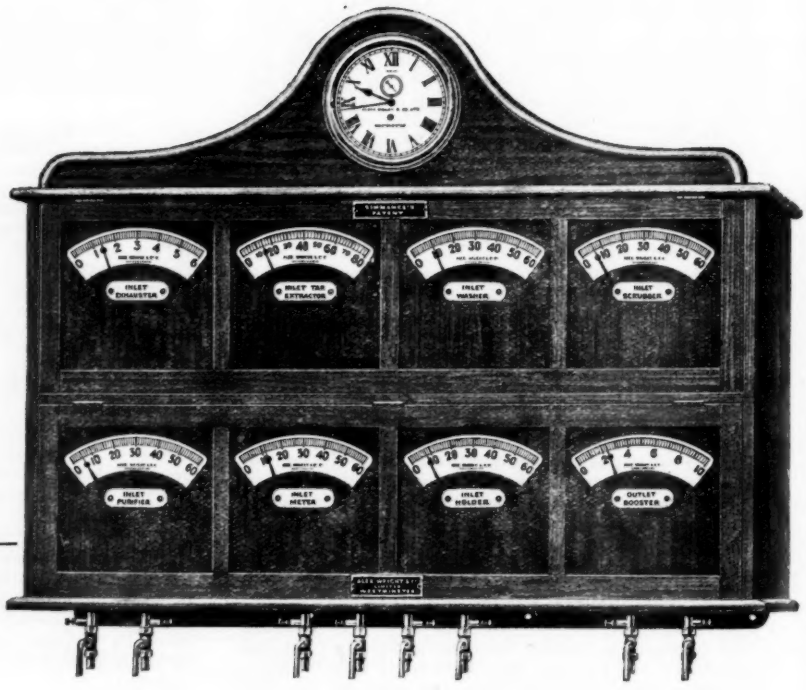
*A typical design is shewn. It could be modified to suit your individual requirements, with any number of points of any range and with RECORDING units if needed. The cabinet can be of any hardwood, and it would be a first-class job. We have supplied batteries and cabinets to many Undertakings, both at home and abroad. Perhaps you have seen some of them, and appreciate the handsome appearance and fine workmanship put into them.*

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# Gas Markets and Manufactures

## Stock Market Report

(For Stock and Share Lists, see later pages)

Markets on the whole were in a somewhat hesitant mood last week and prices suffered as a consequence. Gilt-edged stocks were weak mainly on account of heavy selling to provide funds for income-tax purposes and the absence of support, while home rails became neglected by reason of the latest wages demands. The industrial section was fairly active and produced a few bright spots, notably motor, aviation, and shipping shares. Oils and rubbers were in good demand, and though at one time mining shares were marked down on a reaction in the prices of base metals, values subsequently recovered when these prices strengthened again.

Business in the Gas Market was on a slightly reduced scale, though this is not unusual at this time of the year because of the close proximity of dividend payments. Prices generally, however, remained steady, and it will be seen in the Stock and Share lists that only a few quotations were affected either way. In the Official List, Alliance and Dublin hardened 2 points to 173½, and Imperial Continental was moved up another point to 158½. South Metropolitan dropped 2 points when the reduction of ¼% in the dividend became known, but subsequently closed only 1 point down at 118½. A big drop of 30 points occurred in the Malta and Mediterranean stock though no business was recorded. The only movements at the Provincial Exchanges occurred in Liverpool ordinary with a rise of 2½ to 135½, while Newcastle units dropped a further 6d. to 26s., at which price the yield on the 1935 distribution of £5 7s. 6d.% works out at £4 2s. 8d.%. On the London Exchange, business in these units was recorded last week at 26s. 9d. The Supplementary List remained unchanged.

Final ordinary dividend notices have now commenced to come through, and it is satisfactory to note that of the few rates so far received all with one exception are maintained. Last week's announcements included those of the three Metropolitan Companies which are as follows: Gas Light and Coke, £2 16s.%, making £5 12s. for the year (the rate paid for the past seven years), while the carry-forward is increased from £202,624 to £213,177; South Metropolitan, a final payment of 3%, making 5½% for the year (against 5¾% for 1935); and Commercial 2½%, making 5% for the year (unchanged). Among the Surburban Companies, Wandsworth are again distributing 3½%, making 7% for the year, the rate paid each year since 1930, when the then existing ordinary stocks were converted into consolidated stock.

## Current Sales of Gas Products

### The London Market for Tar Products.

*Jan.* 25.

There is little change to report in the London Tar Products market, prices being as under:

Pitch, nominal at 34s. per ton f.o.b.
Creosote, 5¾d. to 6d.
Refined tar, 3¾d.
Pure toluole, 2s. 4d. to 2s. 5d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, about 1s. 7d.; and 90/160 pyridine, about 8s.—all per gallon naked at makers' works.

### Tar Products in the Provinces.

*Jan.* 25.

The average prices of gas-works products during the week were: Gas-works tar, 18s. 9d. to 23s. 9d. Pitch—East Coast, 33s. to 34s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 33s. to 34s.* Toluole, naked, North, 1s. 11d. to 2s. Coal tar crude naphtha, in bulk, North, 8d. to 8¼d. Solvent naphtha, naked, North, 1s. 4d. to 1s. 5d. Heavy naphtha, North, 1s. 1½d. to 1s. 2½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4⅞d. to 5⅛d.; low gravity, 4½d. to 4¾d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 2s. 7d. to 2s. 8d. Naphthalene, £18 to £20. Salts, 90s. to 95s., bags included. Anthracene "A" quality, 4½d. to 4⅝d. per minimum 40% purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

### Tar Products in Scotland.

GLASGOW, *Jan.* 23.

Business is somewhat hampered by the want of prompt supplies of the finer products. Prices of these products are firm and inclined to rise.

Crude gas-works tar.—The actual value is 35s. to 36s. per ton *ex* works in bulk.

Pitch continues without interest at 30s. to 32s. 6d. per ton f.o.b. Glasgow for export, and 30s. per ton *ex* works in bulk for home trade.

Refined tar is maintained meantime at 3d. per gallon f.o.r. for export, and 3¾d. per gallon *ex* works in buyers' packages for home trade.

Creosote oil.—A good demand exists for available supplies and prices are steady as under: Specification oil, 5¼d. to 5½d. per gallon; low gravity, 5¼d. to 5½d. per gallon; neutral oil, 5d. to 5¼d. per gallon; all *ex* works in bulk.

Cresylic acid.—There is practically nothing available for prompt or early delivery and prices show a further advance during the week. Pale, 97/99%, 2s. 8d. to 2s. 10d. per gallon; dark, 97/99%, 2s. 5d. to 2s. 7d. per gallon; and pale, 99/100%, 3s. to 3s. 3d. per gallon; all *ex* works in buyers' packages.

Crude naphtha.—Available supplies command 5½d. to 6d. per gallon *ex* works in bulk, according to quality and district.

Solvent naphtha.—90/160 grade is valued at 1s. 3d. to 1s. 4d. per gallon, and 90/190 heavy naphtha at 10½d. to 11½d. per gallon.

Motor benzole is available in fair quantities at 1s. 3d. to 1s. 4d. per gallon.

Pyridine.—Prices are nominal at 6s. to 6s. 6d. per gallon for 90/160 grade, and 7s. to 7s. 6d. per gallon for 90/140 grade.

### Benzole Prices.

These are considered to be the market prices for benzole at the present time:

| | s. | d. | | s. | d. | |
|---|---|---|---|---|---|---|
| Crude benzole | 0 | 9 | to | 0 | 9½ | per gallon at works |
| Motor " | 1 | 3 | " | 1 | 3½ | " " " |
| 90% " | 1 | 4 | " | 1 | 4½ | " " " |
| Pure " | 1 | 8 | " | 1 | 8½ | " " " |

## Contracts Advertised To-Day

**Air Compressor.**
Oldham Corporation. [p. 226.]

**Boilers.**
Stoke-on-Trent Gas Department. [p. 226.]

**Coal.**
Hereford Gas Department. [p. 226.]

**Coal Handling Plant.**
Plymouth Corporation Gas Department. [p. 226.]

**Exhausters.**
Middlesbrough Gas Department. [p. 226.]

**Governors, Valves, &c.**
Stoke-on-Trent Gas Department. [p. 226.]

**Mantles.**
Hereford Gas Department. [p. 226.]

**Oils and Grease.**
Hereford Gas Department. [p. 226.]

**Pipes (Various) and Fittings.**
Hereford Gas Department. [p. 226.]
Stoke-on-Trent Gas Department. [p. 226.]

**Sulphuric Acid.**
Hereford Gas Department. [p. 226.]

**Under Pressure Connections and Valves.**
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**Wash Coppers.**
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**Well (Artesian).**
Blackpool Gas Department. [p. 226.]

# Gas and coke production with the best advantages of scientific control . . . .

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- COAL AND COKE-HANDLING & PREPARATION

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THE **BALLYMENA** U.D.C. GAS DEPARTMENT (2ND ORDER)
THE **WORCESTER** NEW GAS LIGHT CO. (2ND ORDER)
THE **YEADON AND GUISELEY** GAS CO. (2ND ORDER)
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THE **DUMBARTON** CORPORATION GAS DEPT. (2ND ORDER)
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THE SOCIETY OF BRITISH GAS INDUSTRIES · 1905 ·

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# STOCK AND SHARE LIST

## Official Quotations on the London Stock Exchange

| Issue. £ | Stock or Share | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations Jan. 22. | Rise or Fall on Week. | Transactions, Lowest and Highest Prices During the Week. |
|---|---|---|---|---|---|---|---|---|
| 1,767,439 | Stk. | Sept. 7 | 7⅞ | 8 | Alliance & Dublin Ord. ... | 171—176 | +2 | 174 |
| 374,000 | ,, | Dec. 14 | 4 | 4 | Do. 4 p.c. Deb. ... | 92—97 | ... | ... |
| 557,655 | ,, | Aug. 10 | 7 | 7 | Barnet Ord. 7 p.c. ... ... | 168—173 | ... | 171½—172 |
| 300,000 | 1 | Oct. 5 | 1 9⅜ | 1 4½ | Bombay, Ltd. ... ... ... | 26/—28/- | ... | ... |
| 179,305 | Stk. | Aug. 10 | 9½ | 9½ | Bournemouth sliding scale ... | 220—230 | ... | ... |
| 590,407 | ,, | ,, | 7 | 7 | Do. 7 p.c. max. ... | 171—176 | ... | 174 |
| 493,960 | ,, | ,, | 6 | 6 | Do. 6 p.c. Pref. ... | 148—153 | ... | 148½—151 |
| 50,000 | ,, | Dec. 14 | 3 | 3 | Do. 3 p.c. Deb. ... | 85—90 | ... | ... |
| 262,025 | ,, | ,, | 4 | 4 | Do. 4 p.c. Deb. ... | 104—109 | ... | ... |
| 335,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Deb. ... | 123—128 | ... | ... |
| 357,900 | ,, | Aug. 10 | 7½ | 7½ | Brighton, &c., 6 p.c. Con. ... | 168—173 | ... | ... |
| 649,955 | ,, | ,, | 6½ | 6½ | Do. 5 p.c. Con. ... | 154—159 | ... | ... |
| 205,500 | ,, | ,, | 6 | 6 | Do. 6 p.c. 'B' Pref. | 145—150 | ... | ... |
| 855,000 | ,, | Oct. 5 | 8 | 7 | British Ord. ... ... ... | 157—162 | ... | 159—161 |
| 100,000 | ,, | Dec. 14 | 7 | 7 | Do. 7 p.c. Pref. ... ... | 148—153 | ... | ... |
| 350,000 | ,, | ,, | 5½ | 5½ | Do. 5½ p.c. 'B' Cum. Pref. | 112—117 | ... | ... |
| 120,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 95—100 | ... | ... |
| 450,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 109—114 | ... | ... |
| 200,000 | ,, | ,, | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 99—102 | ... | ... |
| 100,000 | 10 | 22 May '33 | 6 | 4 | Cape Town, Ltd. ... ... | 1—3 | ... | ... |
| 100,000 | 10 | 6 Nov. '33 | 4½ | 4½ | Do. 4½ p.c. Pref. ... | 1—3 | ... | 38/- |
| 150,000 | Stk. | Jan. 4 | 4½ | 4½ | Do. 4½ p.c. Deb. ... | 80—85 | ... | ... |
| 626,860 | ,, | July 20 | 6 | 6 | Cardiff Con. Ord. ... ... | 128—133 | ... | ... |
| 237,860 | ,, | Dec. 14 | 5 | 5 | Do. 5 p.c. Red. Deb. | 108—113 | ... | ... |
| 98,936 | 1 | Oct. 19 | 2/- | 2/- | Colombo Ord. ... ... | 1⅞—1¾ | ... | ... |
| 24,510 | 1 | ,, | 1 4½ | 1 4½ | Do. 7 p.c. Pref. ... | 23/6—25/6 | ... | ... |
| 739,453 | 1 | Oct. 5 | -/11·48 | -/11·48 | Colonial Gas Assn. Ltd. Ord. | 17/6—19/6 | ... | ... |
| 296,144 | 1 | ,, | 1·30 | 1·30 | Do. 8 p.c. Pref. | 21/—23/- | ... | ... |
| 1,775,005 | Stk. | Aug. 10 | 5 | 5 | Commercial Ord. ... ... | 93—98 | ... | 93½ |
| 620,000 | ,, | Nov. 30 | 3 | 3 | Do. 3 p.c. Deb. ... | 82—87 | ... | 82—83¾ |
| 286,344 | ,, | Aug. 10 | 5 | 5 | Do. 5 p.c. Deb. ... | 122—127 | ... | ... |
| 807,560 | ,, | Aug. 10 | 7 | 7 | Croydon sliding scale ... | 158—163 | ... | 161½ |
| 644,590 | ,, | ,, | 5 | 5 | Do. max. div. ... ... | 115—120 | ... | 117½—118 |
| 620,385 | ,, | Dec. 14 | 5 | 5 | Do. 5 p.c. Deb.... ... | 123—128 | ... | ... |
| 239,000 | ,, | Aug. 10 | 5 | 5 | East Hull Ord. 5 p.c.... ... | 109—113 | ... | ... |
| 184,555 | ,, | Aug. 10 | 6 | 6 | East Surrey Ord. 5.p.c. ... | 128—133 | ... | ... |
| 176,211 | ,, | Dec. 14 | 5 | 5 | Do. 5 p.c. Deb. ... | 121—126 | ... | ... |
| 250,000 | 1 | Nov. 16 | 6 | 4 | Gas Consolidation Ord. ... | 20/6—22/6 | ... | ... |
| 250,000 | 1 | ,, | 4 | 4 | Do. 4 p.c. Red. Cum. Pref. | 19/—21/- | ... | 19/9—20/3 |
| 19,255,284 | Stk. | Aug. 10 | 5⅔ | 5⅔ | Gas Light & Coke 4 p.c. Ord. | 26 3/—27/3*a* | ... | 26/7½—27/- |
| 2,600,000 | ,, | ,, | 3½ | 3½ | Do. 3½ p.c. max. ... ... | 88—92 | −½ | 88—90½ |
| 4,477,106 | ,, | ,, | 4 | 4 | Do. 4 p.c. Con. Pref. ... | 104—108 | ... | 105—106 |
| 8,602,497 | ,, | Nov. 30 | 3 | 3 | Do. 3 p.c. Con. Deb. ... | 84—87 | +1 | 84½—86½ |
| 3,642,770 | ,, | ,, | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 115—118 | ... | 116½ |
| 3,500,000 | ,, | ,, | 4½ | 4½ | Do. 4½ p.c. Red. Deb.... | 114—117 | ... | 115 |
| 700,000 | ,, | Sept. 7 | ... | 25/5§ | Do. 3½ p.c. Red. Deb.... | 102—104 | ... | 104 |
| 270,466 | ,, | Aug. 24 | 6 | 6 | Harrogate New Cons. ... | 128—133 | ... | ... |
| 213,200 | ,, | Aug. 10 | 6 | 6 | Hornsey Con. 3½ p.c. ... | 133—138 | ... | ... |
| 5,600,000 | ,, | Nov. 2 | 12 | 8 | Imperial Continental Cap. ... | 156—161 | +1 | 157—161 |
| 223,130 | ,, | July 20 | 3½ | 3½ | Do. 3½ p.c. Red. Debs.... | 92—97 | ... | 95½ |
| 285,242 | ,, | Aug. 24 | 8½ | 8½ | Lea Bridge 5 p.c. Ord. ... | 186—191 | ... | ... |
| 11,751 | ,, | ,, | 10 | 8 | Maidstone Gas 5 p.c. Cap. Stk. | 190—200 | ... | ... |
| 63,480 | ,, | Dec. 14 | 3 | 3 | Do. 3 p.c.Prp.Db.Sk. | 79—84 | ... | ... |
| 75,000 | ,, | Nov. 30 | †10 | †10 | Malta & Mediterranean ... Metropolitan (of Melbourne) | 150—170 | −30 | ... |
| 392,000 | — | Oct. 1 | 5½ | 5½ | 5½ p.c. Red. Deb. ... ... | 100—105 | ... | ... |
| 231,978 | Stk. | Aug. 24 | 5 | 5 | M.S. Utility 'C' Cons. ... | 111—116 | ... | 115½ |
| 818,657 | ,, | ,, | 4 | 4 | Do. 4 p.c. Cons. Pref. | 102—107 | ... | 104½—105 |
| 360,075 | ,, | Dec. 14 | 4 | 4 | Do. 4 p.c. Deb. ... | 103—108 | ... | ... |
| 148,955 | ,, | ,, | 5 | †5 | Do. 5 p.c. Deb. ... | 121—126 | ... | ... |
| 125,000 | — | Jan. 4 | 3½ | 3½ | Do. 3½ p.c. Rd.Rg.Bds. | 97—100 | ... | ... |
| 675,000 | Stk. | Nov. 16 | †6 | †6 | Montevideo, Ltd. ... ... | 80—85 | ... | 80—82½ |
| 225,000 | ,, | Aug. 10 | 7½ | 7½ | North Middlesex 6 p.c. Con. | 170—175 | ... | ... |
| 396,160 | ,, | Aug. 10 | 5 | 5 | Northampton 5 p.c. max. ... | 110—115 | ... | 113½ |
| 300,000 | ,, | Nov. 2 | †7 | †9 | Oriental, Ltd.... ... ... | 168—173 | ... | ... |
| 416,617 | ,, | Dec. 14 | 8 | 8 | Plymouth & Stonehouse 5 p.c. | 165—170 | ... | ... |
| 504,416 | ,, | Aug. 10 | 8½ | 8½ | Portsmouth & Gosport Cons. | 178—183 | ... | ... |
| 241,446 | ,, | ,, | 5 | 5 | Do. 5 p.c. max. ... | 114—119 | ... | ... |
| 73,350 | ,, | ,, | ... | 5 | Do. 5 p.c. Pref. ... | 118—123 | ... | ... |
| 363,470 | 1 | Sept. 21 | 1/- | 1/- | Severn Val. Gas Cor. Ld. Ord. | 21/—23/- | ... | 21/9—23/- |
| 454,510 | 1 | ,, | -/10½ | -/10½ | ,, ,, 4½ p.c. Cum. Pref. | 21/—23/- | ... | 22/3 |
| 133,201 | Stk. | Aug. 24 | 5 | 8½ | Shrewsbury 5 p.c. Ord. ... | 145—150 | ... | ... |
| 90,000 | 10 | June 8 | †3½ | †4 | South African... ... ... | 4—5 | ... | ... |
| 1,152,635 | 1 | Sept. 7 | 1 2⅝ | 1 2⅝ | South East'n Gas. Cn.Ld. Ord. | 27/—29/- | ... | 28/1½ |
| 845,511 | 1 | ,, | -/10½ | -/10⅝ | Do. 4½ p.c. Red. Cum. Pref. | 21/—23/- | ... | 21/9 |
| 200,000 | 1 | ,, | 4 | 4 | Do. 4 p.c. Cum. Pref. ... | 20/6—21/6 | ... | 20/10½ |
| 150,000 | Stk. | Aug. 10 | ... | 3½ | Do. 3½ p.c. Red. Deb. ... | 100—102 | ... | ... |
| 6,709,895 | ,, | Aug. 10 | 6½ | 5 | South Met. Ord. ... ... | 117—120 | −1 | 117—120¾ |
| 1,135,812 | ,, | ,, | 6 | 6 | Do. 6 p.c. Irred. Pf. ... | 145—150 | ... | 146 |
| 850,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Irred. Pf. ... | 104—107 | ... | ... |
| 1,895,445 | ,, | Dec. 14 | 3 | 3 | Do. 3 p.c. Deb. ... | 82—85 | −1 | 82—84½ |
| 1,000,000 | ,, | Jan. 4 | 5 | 5 | Do. 5 p.c. Red. Deb.... | 113—116 | ... | ... |
| 1,543,795 | ,, | Aug. 10 | 6 | 6 | South Suburban Ord. 5 p.c.... | 130—135 | ... | ... |
| 512,825 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref.... | 121—126 | ... | 123½ |
| 500,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref.... | 102—107 | ... | ... |
| 888,587 | ,, | Dec. 14 | 5 | 5 | Do. 5 p.c. Deb.... | 122—127 | ... | 124 |
| 250,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Deb.... | 103—108 | ... | ... |
| 427,859 | 1 | Nov. 16 | 1 2⅝ | 9½ | S. Western Gas & Water Ord. | 21/—23/- | ... | 21/3—21/10½ |
| 160,523 | 1 | Oct. 19 | -/10½ | -/10½ | Do. 4½% Red. Cum. Pref. | 20/6—22/6 | ... | 22/—22/3 |
| 110,000 | Stk. | Dec. 14 | 4 | 4 | Do. 4% Red. Deb. ... | 100—105 | ... | 115½ |
| 647,740 | ,, | Aug. 10 | 5½ | 5 | Southampton Ord. 5 p.c. ... | 113—118 | ... | ... |
| 121,275 | ,, | Jan. 4 | 4 | 4 | Do. 4 p.c. Deb. | 100—105 | ... | ... |
| 350,000 | ,, | Aug. 10 | 5½ | 5½ | Swansea 5½ p.c. Red. Pref. ... | 112—117 | ... | ... |
| 106,000 | ,, | Jan. 4 | 6½ | 6½ | Do. 6½ p.c. Red. Deb. ... | 98—101 | ... | ... |
| 94,000 | ,, | ,, | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 95—100 | ... | ... |
| 1,076,490 | ,, | Aug. 10 | 6½ | 6½ | Tottenham and District Ord. | 152—157 | ... | 154½ |
| 409,835 | ,, | ,, | 5½ | 5½ | Do. 5½ p.c. Pref.... | 130—135 | ... | ... |
| 62,235 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... | 120—125 | ... | ... |
| 371,850 | ,, | Nov. 30 | 4 | 4 | Do. 4 p.c. Deb. ... | 102—107 | ... | 105½ |
| 369,774 | ,, | Aug. 10 | 7 | 7 | Uxbridge, &c., 5 p.c. ... | 165—170 | ... | ... |
| 108,330 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... | 120—125 | ... | ... |
| 1,340,521 | ,, | Aug. 10 | 7 | 7 | Wandsworth Consolidated ... | 159—164 | ... | 160½—162 |
| 1,371,373 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref ... | 122—127 | ... | 126 |
| 500,000 | ,, | ,, | ... | ... | Do. 4 p.c. Pref. ... | 104½—107½ | ... | ... |
| 1,317,964 | ,, | Dec. 14 | 5 | 5 | Do. 5 p.c. Deb. ... | 125—130 | ... | 126—127 |
| 338,300 | ,, | ,, | 4 | 4 | Do. 4 p.c. Deb. ... | 102—107 | ... | ... |
| 499,735 | ,, | Aug. 10 | 7½ | 7 | Watford and St. Albans Ord. | 157—162 | ... | ... |
| 200,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... | 120—125 | ... | ... |
| 200,000 | ,, | ,, | 5½ | 5½ | Do. 5½ p.c. Pref. ... | 131—136 | ... | ... |
| 200,000 | ,, | Dec. 14 | 4 | 4 | Do. 4 p.c. Red. Deb. | 100—105 | ... | ... |
| 100,000 | ,, | ,, | 3½ | 3½ | Do. 3½ p.c. Red.Deb. | 99—102 | ... | ... |

*a*—The quotaion is per £1 of Stock. * Ex div. † Paid free of income-tax. ‡ For year. § Actual.

**Stock and Share List continued overleaf.**

A Manual of

**Carbonization**

in

**Horizontal Retorts**

by G. M. GILL, M.I.Mech.E., M.Inst.Gas E.

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# STOCK AND SHARE LIST—Cont.

## Stocks Officially Quoted on Provincial Exchanges

| Issue. £ | Stock or Share | When ex-Dividend. | Dividends. Prev. Hf. Yr. % p.a. | Dividends. Last Hf. Yr. % p.a. | NAME. | Quotations. Jan. 22. | Rise or Fall on Week. | Transactions, Lowest and Highest During the Week. |
|---|---|---|---|---|---|---|---|---|
| **BRISTOL EXCHANGE.** | | | | | | | | |
| 347,756 | Stk. | July 20 | 6 | 5 | Bath Cons. ... ... ... | 125—127 | ... | ... |
| 1,667,250 | ,, | July 6 | 5 | 5 | Bristol, 5 p.c. max. ... ... | 119—121 | ... | ... |
| 120,420 | ,, | Dec. 14 | 4 | 4 | Do. 1st 4 p.c. Deb. ... | 102—104 | +½ | ... |
| 217,870 | ,, | ,, | 4 | 4 | Do. 2nd 4 p.c. Deb. ... | 101½—103½ | ... | ... |
| 328,790 | ,, | ,, | 5 | 5 | Do. 5 p.c. Deb. ... ... | 122—125 | ... | ... |
| 274,000 | ,, | Aug. 10 | 5 | 5 | Newport (Mon.) 5 p.c.max. ... | 110—114 | ... | ... |
| 13,200 | 12 | Sept. 7 | 8½ | 7 | Pontyp'l Gas & W. 10 p.c. 'A' | 13½—14½ | ... | ... |
| 13,600 | 10 | ,, | 6 | 5 | Do. 7 p.c. 'B' | 12—12½ | ... | ... |
| 40,000 | 10 | ,, | 6 | 5 | Do. 7 p.c. 'C' | 12—12½ | ... | ... |
| 140,778 | Stk. | Aug. 10 | 5 | 5 | Weston-super-Mare Cons. ... | 112—114 | ... | ... |
| 64,338 | ,, | Dec. 14 | 4 | 4 | Do. 4 p.c. Deb. | 98—101 | ... | ... |
| 33,340 | ,, | ,, | 7½ | 7½ | Do. 7½ p.c. Deb. | 160—163 | ... | ... |
| **LIVERPOOL EXCHANGE.** | | | | | | | | |
| 157,150 | Stk. | Aug. 10 | 6½ | 5 | Chester 5 p.c. Ord. ... ... | 107—112 | ... | ... |
| 92,500 | ,, | Dec. 14 | 4½ | 4 | Do. 4 p.c. Pref. ... ... | 98—102 | ... | ... |
| 32,540 | ,, | ,, | 3 | 3½ | Do. 3½ p.c. Deb.... ... | 90—95 | ... | ... |
| 41,890 | ,, | ,, | 4 | 4 | Do. 4 p.c. Red. Deb. ... | 99—103 | ... | ... |
| 2,167,410 | ,, | Aug. 24 | 6 | 6 | Liverpool 5 p.c. Ord. ... | 134½—136½ | +2½ | ... |
| 245,500 | ,, | Dec. 14 | 5 | 5 | Do. 5 p.c. Red. Pref. ... | 101—106 | ... | ... |
| 306,083 | ,, | Jan. 4 | 4 | 4 | Do. 4 p.c. Deb. ... | 103—105* | ... | ... |
| 106,280 | ,, | July 20 | 10 | 10 | Preston 'A' 10 p.c. ... ... | 198—208 | ... | ... |
| 188,219 | ,, | ,, | 7 | 7 | Do. 'B' 7 p.c. ... ... | 137—147 | ... | ... |
| **NEWCASTLE EXCHANGE.** | | | | | | | | |
| 122,577 | Stk. | Aug. 10 | 8 | 8 | Blyth 5 p.c. Ord. ... ... | 166—168 | ... | ... |
| 732,000 | ,, | Aug. 10 | 5 | 5 | Hartlepool G. & W. Cn. & New | 125—127 | ... | ... |
| 2,061,315 | ,, | Aug. 10 | 5½ | 5 | Newcastle & Gateshead Con. | 25 9—26 3*a* | −.6 | ... |
| 682,856 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref. ... | 104—105 | ... | ... |
| 776,706 | ,, | Jan. 4 | 3½ | 3½ | Do. 3½ p.c. Deb. ... | 100—102 | ... | ... |
| 277,285 | ,, | Nov. 2 | 5 | 5 | Do. 5 p.c. Deb. '43... | 108—109 | ... | ... |
| 209,820 | ,, | Aug. 10 | 8½ | 8½ | South Shields Con. ... ... | 172—174 | ... | ... |
| 299,542 | ,, | Aug. 10 | 6 | 6 | Sunderland 6 p.c. max. ... | 140—142 | ... | ... |
| **NOTTINGHAM EXCHANGE.** | | | | | | | | |
| 542,270 | Stk. | Aug. 10 | 10 | 7 | Derby Con. ... ... ... | 185—195 | ... | ... |
| 55,000 | ,, | Dec. 14 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 100—105 | ... | ... |
| 84,750 | ,, | Feb. 17 | 5 | 12 | Long Eaton 'A' Ord. ... | ... | ... | ... |
| 50,000 | ,, | ,, | 4 | 10 | Do. 'B' Ord. ... | ... | ... | ... |
| 20,000 | 10 | Dec. 14 | 5 | 5 | Do. 5 p.c. Pref. ... | 10—12 | ... | ... |
| 80,000 | Stk. | ,, | 5 | 5 | Do. 5 p.c. Deb. ... | 117—122 | ... | ... |
| **SHEFFIELD EXCHANGE.** | | | | | | | | |
| 10,000 | Stk. | Aug. 10 | 10 | 10 | Great Grimsby 'A' Ord. ... | 220—230 | ... | ... |
| 6,500 | ,, | ,, | 10 | 10 | Do. 'B' Ord. ... | 220—230 | ... | ... |
| 79,000 | ,, | ,, | 10 | 10 | Do. 'C' Ord. ... | 205—215 | ... | ... |
| 1,806,339 | ,, | Aug. 24 | 6 | 6 | Sheffield Cons. ... ... | 146—148 | ... | ... |
| 95,000 | ,, | Jan. 4 | 4 | 4 | Do. 4 p.c. Deb. ... ... | 101—104* | ... | ... |

*a* The quotation is per £1 of Stock.

## Supplementary List of Stocks and Shares not Officially Quoted

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 202,152 | Stk. | Nov. 2 | 5 | 25/-*a* | Ascot Ord. ... ... ... | 118—123 | ... | ... |
| 128,182 | ,, | Jan. 4 | 5 | 5 | Do. 5 p.c. Pref. ... ... | 115—120* | ... | ... |
| 312,083 | 1 | Nov. 16 | 5 | 5 | Assd. Gas and Water Ord. ... | 21/6—23/6 | ... | 22/9 |
| 326,071 | 1 | ,, | 4½ | 4½ | Do. 4½ p.c. Cum. Pref. ... | 21/—23/- | ... | ... |
| 150,000 | Stk. | Sept. 21 | ... | 3½ | Do. 3½ p.c. Red. Deb. ... | 98—101 | ... | ... |
| 17,000 | ,, | Aug. 24 | 8 | 8 | Bognor Orig. Ord. 'A' ... | 175—185 | ... | ... |
| 62,210 | ,, | ,, | 8 | 8 | Do. New Addl. 'A' ... | 175—185 | ... | ... |
| 87,160 | ,, | ,, | 7 | 7 | Do. New 7 p.c. max. ... | 145—150 | ... | ... |
| 37,440 | ,, | Aug. 10 | 10 | 10 | Cam. Univ. & Town 10 p.c.max. | 205—215 | ... | ... |
| 125,970 | ,, | ,, | 7 | 7 | Do. 7 p.c. max. ... ... | 155—160 | ... | ... |
| 39,025 | ,, | ,, | 5 | 5 | Do. 5 p.c. max. ... ... | 108—113 | ... | ... |
| 65,000 | ,, | Aug. 10 | 8½ | 7½ | Eastbourne 'A' 5 p.c. ... | 175—180 | ... | ... |
| 198,000 | ,, | ,, | 7 | 6 | Do. 'B' 3½ p.c. ... ... | 142—147 | ... | 143 |
| 112,312 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 118—123 | ... | ... |
| 130,000 | ,, | Dec. 14 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 122—127 | ... | ... |
| 24,000 | 30 | Aug. 10 | 8½ | 8½ | Great Yarmouth 8½ p.c. max. | 51—56 | ... | ... |
| 59,400 | 30 | ,, | 7½ | 7½ | Do. 7½ p.c. max. ... ... | 42—45 | ... | ... |
| 51,160 | Stk. | Dec. 14 | 5½ | 5½ | Do. 5½ p.c. Deb. ... | 123—128 | ... | ... |
| 152,600 | ,, | Sept. 7 | 8 | 8 | Guildford Cons. ... ... | 200—210 | ... | ... |
| 54,055 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 114—119 | ... | ... |
| 68,250 | ,, | Dec. 14 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 120—125 | ... | ... |
| 156,600 | ,, | Aug. 24 | 7½ | 7½ | Hampton Court Cons. ... | 173—178 | ... | ... |
| 107,960 | 10 | Oct. 5 | 5½ | 4 | Mid Kent Ord. ... ... | 8½—9½ | ... | ... |
| 230,940 | Stk. | Aug. 10 | 10 | 10 | Oxford & District Ord. ... | 215—225 | ... | 218½ |
| 47,112 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 118—123 | ... | ... |
| 50,000 | ,, | ,, | 6 | 6 | Do. 6 p.c. Red. Pref. ... | 113—118 | ... | ... |
| 126,193 | ,, | Nov. 16 | 7½ | 7½ | Peterborough Ord. ... ... | 162—172 | ... | ... |
| 64,990 | ,, | Sept. 7 | 6½ | 7½ | Redditch Ord. ... ... | 133—143 | ... | ... |
| 166,850 | ,, | Aug. 10 | 9 | 8 | Romford Ord. ... ... | 160—170 | ... | ... |
| 60,000 | ,, | ,, | 4 | 4 | Do. 4 p.c. Pref. ... ... | 97—100 | ... | ... |
| 44,000 | ,, | Sept. 21 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 120—125 | ... | ... |
| 10,950 | ,, | Aug. 24 | 8 | 8 | Ryde Ord. ... ... ... | 165—170 | ... | ... |
| 136,191 | ,, | Aug. 10 | 7 | 5 | Scarborough Ord. ... ... | 126—136 | ... | ... |
| 27,825 | ,, | Aug. 24 | 8 | 8 | Shanklin & Ventnor Cons. ... | 170—180 | ... | ... |
| 40,643 | ,, | Sept. 21 | 7 | 7 | Slough Ord. ... ... ... | 156—161 | ... | ... |
| 221,000 | ,, | Dec. 14 | 5 | 5 | Do. 5 p.c. Deb.... ... | 116—121 | ... | ... |
| 28,872 | 1 | Nov. 2 | 5½ | 5½ | S. Midland Gas Cpn. Ltd. Ord. | 22/—24/- | ... | ... |
| 28,866 | 1 | Sept. 7 | 4½ | 4½ | Do. 4½ p.c. Red. Cum. Pref. | 22/—24/- | ... | ... |
| 137,730 | Stk. | Aug. 10 | 7 | 7 | Southgate & Dist. 7 p.c. max. | 151—156 | ... | ... |
| 62,500 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 120—125 | ... | ... |
| 117,228 | ,, | Aug. 10 | 6 | 5 | Swindon Cons. ... ... | 110—115 | ... | ... |
| 60,425 | ,, | Dec. 14 | 5 | 5 | Do. 5 p.c. Deb. ... ... | 118—123 | ... | ... |
| 64,380 | ,, | Dec. 14 | 5 | 5 | Torquay and Paignton 5 p.c. Pf. | 115—120 | ... | ... |
| 750,000 | 1 | Oct. 5 | 5·52d.*a* | 4 | Utd. Kingdom Gas Cpn. Ord. | 21/6—22/6 | ... | 21/9—22/3 |
| 606,270 | 1 | ,, | 2½ | 2½ | Do. 4½ p.c. Prefd. Ord. ... | 20/—22/- | ... | 20/—20/9 |
| 936,338 | 1 | Nov. 16 | 4½ | 4½ | Do. 4½ p.c. Cum. Pref. ... | 21/6—23/6 | ... | 21/7½—22/3 |
| 600,000 | Stk. | Sept. 21 | 3½ | 3½ | Do. 3½ p.c. Red. Deb. ... | 99—102 | ... | 101 |
| 130,000 | ,, | Aug. 10 | 8 | 5 | Wakefield Ord. ... ... | 140—145 | ... | ... |
| 81,650 | ,, | ,, | 5 | 5 | Do. 5 p.c. max. ... ... | 105—110 | ... | ... |
| 82,000 | ,, | July 20 | 6 | 6 | Weymouth Ord. ... ... | 105—110 | ... | ... |
| 98,384 | ,, | Aug. 10 | 6 | 6 | Wolverhampton 6 p.c. Pref.... | 127—132 | ... | ... |
| 160,000 | ,, | Dec. 14 | 5½ | 5½ | Do. 5½ p.c. Rd. Db | 110—115 | ... | ... |
| 370,000 | ,, | July 20 | 6 | 4 | York Cons. ... ... ... | 110—120 | ... | ... |
| 90,000 | ,, | Dec. 14 | 5 | 5 | Do. 5 p.c. Red. Deb. ... | 108—113 | ... | ... |
| 133,640 | ,, | July 20 | 6½ | 6½ | Yorktown (Cam.) 5 p.c ons. | 140—150 | ... | ... |
| 120,000 | ,, | ,, | 5 | 5 | Do. 5 p.c. Pref. ... ... | 123—128 | ... | ... |
| 35,000 | ,, | Dec. 14 | 5½ | 5½ | Do. 5½ p.c. Deb. ... ... | 128—133 | ... | ... |

*a* Actual.


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